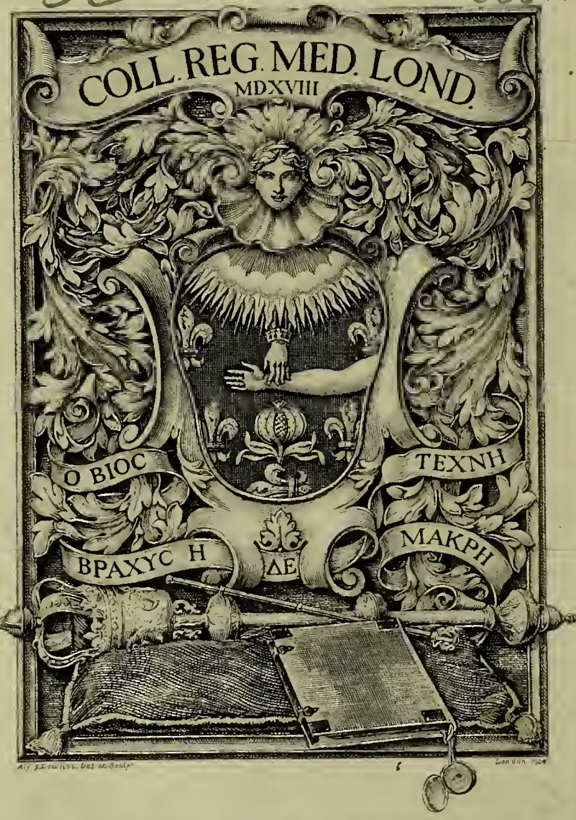
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THE

CYCLOPÆDIA;

OR,

Universal Dictionary

OF

ARTS, SCIENCES, AND LITERATURE.

VOL. XI.

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THE

CYCLOPÆDIA;

OR,

UNIVERSAL DICTIONARY

OF

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CYCLOPÆDIA:

OR, A NEW

UNIVERSAL DICTIONARY

OF

ARTS and SCIENCES.

D, The fourth letter in the alphabet, and the third conſonant.

The letter D is the fourth in the Hebrew, Chaldee, Samaritan, Syriac, Greek, and Latin alphabets; in the five firſt of which languages it has the ſame name, though ſomewhat differently ſpoken, *e. gr.* in Hebrew, Samaritan, and Chaldee, *Daleth;* in Syriac, *Dolath;* and in Greek, *Delta*.

The Arabians have three D's in their language, the firſt called *Dal*, which is the eighth of the twenty-eight letters; the ſecond, called *Dhſal*, is only diſtinguiſhed from the former by having a point added over it; though its ſound is much the ſame with that of the Z: the third, which is their ſeventeenth letter, is called *Da*, and pronounced like our D, though in form it reſembles the Arabic *Ta*, the difference being a point added at the top. The form of our D is the ſame with that of the Latins; as appears from all the ancient medals and inſcriptions. And the Latin D is no other than the Greek Δ, rounded a little, by making it quicker, and at two ſtrokes. The Δ of the Greeks, again, is borrowed from the ancient character of the Hebrew *Daleth;* which form it ſtill retains on the Samaritan coins, as is ſhewn by the Jeſuit Souciet, in his Diſſertation on the Samaritan Medals. All the alteration the Greeks have made in it, is the making it ſtoop a little, and taking away a little line. Nor would it be difficult to ſhew, that the Syriac *Dolath*, and the Arabic *Dal*, are both borrowed from the ancient Hebrew, as well as the ד *Daleth* of the modern, or Chaldee Hebrew.

Some indeed will have it, that the Greek Δ, *Delta*, is borrowed from the Egyptians, who made their D of three ſtars diſpoſed in a triangle; which was a hieroglyphic that among them denoted God, the ſovereign Being, as if they had ſome notion of a Trinity: but this ſurmiſe is weakly ſupported.

Grammarians generally rank D among the lingual letters, as ſuppoſing the tongue to have the principal ſhare in the pronunciation thereof; though the abbot de Dangeau ſeems to have reaſon in making it a palatal letter. It has one uniform ſound, nearly approaching to that of T, but formed by a ſtronger appulſe of the tongue to the upper part of the mouth.

D is alſo a numeral letter ſignifying *five hundred*, which ariſes hence, that in the Gothic characters the D is half the M, or CIↄ, which ſignifies a thouſand. Hence the verſe:

"Litera D velut A Quingentos ſignificabit."

A daſh added at the top of the $\overline{\mathrm{D}}$, denotes it to ſtand for *five thouſand*.

D uſed in abbreviation has various ſignifications; thus,

D ſtands for doctor, and M.D. doctor of medicine, D.T. doctor of theology, D.D. doctor of divinity, or *dono dedit;* D.D.D. is uſed for *dat, dicat, dedicat;* and D.D.D.D. for *dignum deo donum dedit*.

Among Roman writers, D ſtands for *divus, decimus, devotus, diebus*, and *diutius*.

D.M. in the Roman epitaphs ſignifies *diis manibus*, but on other occaſions *deo magno*, or *diis magnis;* D.N. denoted *dominus noſter*, a title given by the Romans to their emperors.

D, on the French coins, is the mark of the city of Lyons.

D, in the chemical alphabet, ſignifies vitriol.

D, in *Engliſh Muſic*, is the initial of *D-ſol-re*, the 5th above gammut, in the ſcale of Guido. It occupies the 3d line in the baſe, and the 4th in the treble. In all tenor clefs it is in the ſpace immediately above the line on which the clef is placed. In French muſic, D has the ſame ſignification as P in the Italian; that is to ſay, *doux, ſoft*. The Italians ſometimes uſe it for *dolce*, which is not only oppoſed to *forte, loud*, but to rough and coarſe, and in Italian and Spaniſh muſic for keyed-inſtruments, it is uſed for *deſtra, the right-hand*. D, in German muſic, implies diſcant, or treble, in thorough baſe. In French muſic, it likewiſe

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ftands for *deſſus*, or *the treble part; d. m. dextra manu*, with the right-hand, is implied in leſſon-playing; and D. C. implies *Da Capo;* which ſee.

DA, is an Italian prepoſition, which implies *for:* as *da* cappella, for the chapel; ſonate *da* camera, chamber-ſonatas; ſonate *da* chieſa, ſonatas for the church. *Da* capo, repeat the firſt part from the beginning; *da* ſuonare, to be played in a ſong where the initial and incidental ſymphonies, or ritornelli, are inſerted in the ſame line as the voice part.

DAÆ, in *Ancient Geography*. See Dahæ.

DAALDER, in *Commerce*. See Dollar and Coin.

DAALHAUSEN, in *Geography*, a town of Germany, in the circle of Weſtphalia, and biſhopric of Paderborn; 9 miles N.N.E. of Warburg.

DAB, in *Ichthyology*, a name given by the Engliſh to a ſmall fiſh of the pleuronectes kind, called by authors the *paſſer aſper* and *limanda*. See Pleuronectes *limanda*.

DABAIBA, in *Mythology*, an idol of the inhabitants of Panama. This goddeſs, having been a female of diſtinguiſhed virtue, was deified after her death, and called by her votaries "the mother of God." To her anger they aſcribe thunder and lightning. In honour of her they burnt ſlaves as ſacrifices; and they worſhip her by faſting three or four days together, and by trivial acts of devotion, ſuch as ſighs, groans, extacies, and the like.

DABARITA, or Darabita, in *Ancient Geography*, a village of Paleſtine, according to Joſephus, ſituated at the extremity of Galilee and Samaria.

DABASÆ, a people of India, on the other ſide of the Ganges.

DABASCHET, Dabbaschet, or *Dalbaſeth*, the frontier town of the tribe of Zabulon, in Paleſtine.

DABBER, in *Agriculture*, a term applied in ſome diſtricts to the tool uſed in dibbling, or ſetting different ſorts of crops, as thoſe of wheat, potatoes, and others. It is more frequently called a dibble or ſetting ſtick. See Dibble.

DABBERETH, in *Ancient Geography*, a town of Judæa, in the diviſion of the tribe of Iſſachar, according to the book of Joſhua; allotted to the Levites of the family of Gerſhon; and probably that called by Jerome *Dabira*, which he places towards mount Thabor, in the canton of Diocæſarea.

DABBING, in *Agriculture*, is a word ſometimes uſed to ſignify the operation of dibbling. See Dibbling.

DABBUDA, in *Muſic*, a kind of Turkiſh dulcimer.

DAB-CHICK, in *Rural Economy*, a term which is ſometimes made uſe of to ſignify a chick which has been juſt hatched.

DABER, in *Geography*, formerly called *Dober*, a ſmall town of Pruſſia, in Pomerania, in the ancient duchy of Caſſuben, or Caſſubia.

Daber, or *Debir*, called *Kirjath-Sepher*, a town of Paleſtine, in the tribe of Judah, not far from Hebron. It was given to the Levites; after Joſhua had taken it and put its king to death.

DABHAUSEN, a ſmall town of Germany, in the circle of the Upper Rhine, with ſome thriving manufactures which were eſtabliſhed after the revocation of the edict of Nantes by induſtrious French Proteſtant refugees. It belongs to the counts of Solms, who at preſent hold their fiefs under the ſupremacy of the king of Weſtphalia.

DABIA, in *Ancient Geography*, a town of Africa, in Mauritania Tingitania, near mount Cirna.

Dabia, or *Dabai*, in *Geography*, a town of Egypt; 21 miles S. of Cairo.

DABIS, in *Mythology*, a deity of Japan, in repreſentation of which a large brazen Coloſſus, or image, is placed on the road from Oſacia to Sorungo. To this deity is offered annually a ſpotleſs virgin, who, being inſtructed to aſk the god ſome particular queſtions, receives an anſwer from a bonze, or prieſt, encloſed within the hollow of this idol.

DABLIS, in *Ancient Geography*, a town of Aſia Minor, in Bithynia; 24 miles from Cœnos Gallicanos, according to the Itinerary of Antonine.

DABO. See Dachsperg.

DABRA-SHIN, in *Geography*, a town of Egypt; 12 miles S. of Cairo.

DABUH, in *Zoology*, a name given by the Arabs to the hyæna.

DABUL, in *Geography*, a town of India, on the coaſt of Concan, taken and ſacked by the Portugueſe, under the conduct of Almeyda, in 1509; but re-taken by the natives. The principal articles of its commerce are pepper and ſalt; 75 miles S. of Bombay. N. lat. 17° 52′. E. long. 72° 53′.

Da Capo, Ital. muſical terms, implying, after an air or movement ſeems finiſhed, a return to the firſt part or ſtrain, which is to be repeated from the beginning, to the corona, 𝄐, or final mark; in the early periods of the opera, and of cantatas, when recitatives for the dialogue and narrative parts of a poem began to be terminated by ſhort airs, which often ſerved for ſeveral different ſtanzas, like thoſe of modern ballads. Before the terms da capo were in uſe, the air was written over again, as often as it was wanted, ſometimes in exactly the ſame notes, but more frequently, with little changes and embelliſhments, to the ſame baſe, and to different ſtanzas.

In the opera of Orontea, by Ceſti, performed at Venice, 1666, there are frequent returns to particular portions of the airs, more, indeed, in the manner of a refrein, or burden, than da capo, or rondo; but in the opera of Enea, performed at Genoa, 1676; in that of Aurora, ſet by Zanetti, and performed in the ſame city, 1678, there is a conſtant da capo, or return to the firſt part of each ſong. The practice ſeems to have begun about the year 1660. And in 1661, we find it ſometimes uſed in the opera of Clearco, ſet by Tenaglia, and performed at Rome. In the motets, *à voce ſola*, di Monferrato, printed 1673, da capos occur; about which time they became frequent; and before 1680, they appear to have been in conſtant uſe.

Among new muſical technica in the Arioſe Cantate of Sebaſtian Enno, publiſhed at Venice, 1655, we find da capo ſe piace, if you pleaſe. But the firſt intereſting air in a ſerious opera, that was performed in England, without a da capo, we believe, was, Se cerca ſe dice, in 1742, as ſet with ſuch dramatic propriety and effect by Pergoleſi, and ſung by Monticelli. The next was Rende mi il figlio mio, ſung by the Mattei in Cocchi's Ciro riconoſciuto, 1759. But it was in the operas of J. Chr. Bach, that da capos firſt totally diſappeared, and which, about this time, began to be generally diſcontinued: the ſecond part being incorporated with the firſt, to which, after modulating into the 5th of the key, the finger generally returns.

DACCA, in *Geography*, a town of Hindooſtan, ſituated in the eaſtern quarter of Bengal, and beyond the principal ſtream of the Ganges, though a very conſiderable branch of the ſame river runs through it. It is very favourably ſtationed for an inland emporium of trade, as the Dacca river communicates directly and not circuitouſly with all the other inland navigations. Dacca ſucceeded Sonergorg, as the provincial capital of this quarter; and it is the third city of Bengal, with reſpect to extent and population. It has a vaſt trade in muſlins, which are among the moſt delicate that are ſought after in Europe; and the cotton is produced within the province. Within the laſt century Dacca

was the capital of Bengal. It has ftill the remains of a ftrong fortrefs; and within a few years it had in its vicinity a cannon of extraordinary weight and dimenfions, which has fince, together with the bank on which it refted, fallen into the river. Major Rennell has given the dimenfions of this curious piece of artillery from his own meafurement. His account of it is as follows; "It was made of hammered iron; it being an immenfe tube formed of 14 bars, with rings of 2 or 3 inches wide driven over them, and hammered down into a fmooth furface; fo that its appearance was equal to that of the beft executed piece of brafs ordnance; although its proportions were faulty.

Whole length -	22 feet	$10\frac{1}{2}$ inches.
Diameter at the breech	3	3
————4 feet from the muzzle	2	10
————of the muzzle -	2	$2\frac{1}{2}$
————of the bore -	1	$3\frac{1}{8}$

The gun contained 234,413 cubic inches of wrought iron; and confequently weighed 64,814 pounds avoirdupoife, or about the weight of eleven 32 pounders. Weight of an iron fhot for the gun 465 pounds.

Dacca is fituated about 100 miles above the mouth of the Ganges, and 180 by the road from Calcutta. The country round it lying low, and being always covered with verdure during the dry months, it is not fubject to fuch violent heats as Moorfhedabad, Patna, and other places. Its fituation is 601 miles S. E. from Benares, 790 in the fame direction from Lucknow, 120 E.S.E. from Moorfhedabad, and 177 N. E. from Calcutta. N. lat. 23° 43′. E. long. 90° 30′.

DACE, in *Ichthyology*, the Englifh name for the fifh, called by authors the *leucifcus*. See Cyprinus *leucifcus*.

The dace is very common in our rivers, and is a remarkably lively fifh. They fpawn in February, and the males at that time are fpotted and fcabby, as in the rudd, &c. and are in higheft feafon for the table in April and May; but they are never a very well-tafted fifh, or much efteemed.

This fifh gives the expert angler great diverfion. The dace will bite at any fly; but he is more than ordinarily fond of the ftone-caddis, or May-fly, which is plentiful in the latter end of April, and the whole month of May. In warm weather this fifh very feldom refufes a fly at the top of the water; but at other times he muft have the bait funk to within about three inches of the bottom. The winter fifhing for dace requires a very different bait: this is a white maggot with a reddifh head, which is the produce of the eggs of the beetle, and is turned up with the plough in great abundance. A parcel of thefe put in any veffel, with the earth they were taken in, will keep many months, and fupply an excellent bait.

Small dace may be put into a glafs jar with frefh water, and there preferved alive for a long time, if the water be properly changed. They have been obferved to eat nothing but the animalcula in the water. They will grow very tame by degrees. Phil. Tranf. N° 487. p. 23. feq.

DACHARENI, in *Ancient Geography*, a people of Arabia Felix. Ptolemy.

DACHAU, in *Geography*, a town of Bavaria, feated on an eminence on the river Ammer, in the diftrict of Munich in Upper Bavaria, remarkable for an ancient caftle. There is a communication between this place and Schleifheim, a country palace of the kings of Bavaria, by means of a canal.

DACHETZ, or Daczice, a fmall town of Auftria, in the margraviate of Moravia, in the diftrict of Iglau, on the river Teya, with a convent of Francifcan friars.

DACHINABADES, in *Ancient Geography*, a very populous country of India, S. of Barygaza, according to Arrian, in the Periplus of the Erythrean fea.

DACHSBACH, in *Geography*, a town of Germany, in the circle of Franconia, and principality of Culmbach; 22 miles S. of Bamberg.

DACHSPERG, Dagsbourg, or *Dabo*, a fmall town of France, in the department of the Lower Rhine, in the diftrict of Saverne, fituated among the mountains called the Vofges, near the fource of the river Sarre; 9 miles S. of Saverne.

DACHSTEIN, a fmall town of France, in the department of the Lower Rhine, in the diftrict of Strafbourg; 3 miles N. E. of Molfheim.

DACHSTUL, a town of Germany, in the circle of the Upper Rhine, and principal place of a lordfhip, which gives the poffeffor a feat and vote at the diets of the circle, but not of the empire; 22 miles S. E. of Treves.

DACI, in *Ancient Geography*, the people of Dacia, who inhabited the country N. of the Danube, from the plains occupied by the Sarmatian Jazyges, to the mouths of this river and the coaft of the Euxine fea. They had the fame language with the Getæ. Strabo fays, that they inhabited the upper part of this country, as it refpects the courfe of the river, from the territory of the Suevi to that of the Tyrigetæ; and he affigns to the Getæ the lower part. Pliny, Steph. Byz., and Dion Caffius fay, that thefe people were called Getæ by the Greeks, and Dacians by the Romans. Herodotus calls them Scythians, and he gives them the epithet of immortals, becaufe they thought that, after death, they went to Zamolxis, who was a difciple of Pythagoras. He had left them fome inftructions, which laid the foundation of their religion. They were a brave people. Alexander made war againft them and burnt their city. The fucceffors of this prince attempted to fubdue them, but one of their chiefs, having taken Lyfimachus, convinced them that they had done wrong in attacking a people as poor as they were brave. However, after the death of their king Berebiftus, they quarrelled among themfelves, and unable to collect more then 20,000 men againft Auguftus, he vanquifhed them without difficulty. They afterwards caufed fome difturbance under Domitian; but Trajan effectually fubdued them, and reduced their country into the ftate of a Roman province. Florus fays, that the Dacians croffed the Danube, and advanced as far as Thrace, Macedonia, and Illyrium. Suetonius relates that Cæfar defigned to reftrain their progrefs; but this defign was accomplifhed by Auguftus. The emperor Aurelian, according to Vopifcus, defpairing of preferving Dacia on the other fide of the Danube, formed a new province of Dacia between the two territories denominated Mœfia.

It appears, however, that the Dacians inhabited the whole extent of country that lies between the Pruth, the Danube, the Tibifcus, and the Carpathian mountains; and this was called "Dacia vera," or the province of Trajan. Under the reign of Trajan, Decebalus, king of the Dacians, revolted: upon which their prince, A.D. 106, carried his arms into Dacia, twice defeated thefe people, and formed their country into a Roman province, which was for a long time diftinguifhed by the name of "Provincia Trajani." See Dacia.

DACIA, the ancient name of two countries of Europe; the one on this fide of the Danube called "Dacia Aureliani;" the other, called "Dacia Trajani," on the other fide of the river. The latter comprehended Tranfylvania, Moldavia, Wallachia, and the bannat of Temefwar, or

 that

that country of Europe between the Danube and the Carpathian mountains, which, after an obftinate ftruggle of five years, was fubdued by the Romans, annexed to the Roman empire in the reign of Trajan and joined to Mœfia, or modern Bulgaria, by an admirable bridge, the ruins of which are ftill feen near Tfchernetz.

The river Tyras, Danafter, or Niefter, which runs from the north-weft to the fouth-eaft, ferved with the Alpes Baftarnicæ, or Carpathian mountains, to form the boundary of this province to the north and north-eaft. On the eaft was the Euxine fea, and on the weft it was defended by an intrenchment. According to M. D'Anville, it was about 13 hundred miles in circumference. In the centre of the country was mount "Concajou," which was deemed facred by the Getæ. The principal rivers were the Danube, the Tibifcus, Ternes, or Teyfs, the Aluta, the Ordeffus, the Ararus, the Porata or Pretus, fuppofed to be the Hieraffus of Ptolemy, and the Tyras or Danafter. The chief towns of Dacia were, towards the north-weft, Napoca, Prætoria Augufta, Apulum, Tibifcus, and Zarmigethufa, called Ulpia Trajana; along the Danube from weft to eaft, Lederata oppofite to Vominacium, which belonged to Mœfia, and Ternes, near the bridge of Trajan. The ancient hiftorians fcarcely make mention of the country, known under the name of Dacia, before the time when Darius carried his arms againft the Daci in the year 508, B. C. After having traverfed the Thracian Bofphorus, he was in danger of lofing his whole army in the country of the Getæ, between the Ifter and the Aluta. Lyfimachus, to whom Thrace was allotted in the general diftribution after the death of Alexander, made an unfuccefsful attack upon the Dacians, and was taken prifoner. In the times of Cæfar and Auguftus, they took up arms againft the Romans. However, Auguftus and his firft fucceffors reftrained, both the Daci and Getæ, within the country on the other fide of the Danube. Neverthelefs, when the river was frozen and became paffable, they made occafional incurfions into the territory of the empire for the fake of pillage. Auguftus, in order to keep them within their own boundaries, entered into feveral treaties with them, the general character of which was moderation. Under the fucceeding emperors the Dacians frequently recurred to arms; and under Domitian, Decebalus, their king, entered Mœfia and defeated Oppius Sabinus; but this emperor concluded with them a difgraceful peace, and entered Rome in triumph.

Trajan obtained a degreee of fuccefs, correfponding to his valour and military virtues; and advancing into the country humbled Decebalus and conftrained him to fue for peace, which the emperor granted him, though he proved treacherous, and attempted by his emiffaries, to affaffinate Trajan. The Roman forces afterwards penetrated into the country, and Decebalus, defpairing of being able to refift them, put an end to his own life. Trajan, as we have already faid, reduced Dacia into a Roman province and conftructed a bridge over the Danube. Zarmigethufa, the capital, affumed the name of the conqueror, and was from this time called Ulpia Trajana. Under the reigns of Adrian and Antonine the Dacians remained quiet; but neither they nor the emperors in fubfequent periods adhered to the terms of the treaties and conventions that had been eftablifhed between them: at a fubfequent period the Goths, among other inhabitants of the northern regions, invaded the Roman provinces; and they were particularly allured by the rich harvefts which covered the fields of Dacia. This new and unfettled province was neither ftrong enough to refift, nor rich enough to fatiate the rapacioufnefs of the barbarians. As long as the remote banks of the Niefter were confidered as the boundary of the Roman power, the fortifications of the Lower Danube were more carelefsly guarded, and the inhabitants of Mœfia lived in fupine fecurity, fondly conceiving themfelves at an inacceffible diftance from any barbarian invaders. The irruptions of the Goths, however, under the reign of Philip, fatally convinced them of their miftake. Cniva, the king, or leader of that fierce nation, traverfed with contempt the province of Dacia, and paffed both the Niefter and the Danube without encountering any oppofition capable of retarding his progrefs. At length the emperor Aurelian terminated the Gothic war, which had for 20 years occafioned great calamities both to the Goths and the Romans, by a lafting and beneficial treaty. As a confequence of this treaty, the emperor, in the year 274, relinquifhed the fovereignty of thefe Trans-Danubian provinces, and withdrew the Roman troops and colonifts to the Cis-Danubian provinces of ancient Mœfia and Illyricum, or modern Bulgaria, Servia, and Bofnia, which were called Hither Dacia. Such of the Roman colonifts as chofe to remain beyond the Danube were incorporated with the Goths, and ferved as a medium of intercourfe between the Romans on the fouth fide of the Danube and the new fettlers. The policy of Aurelian was juftified by the event. The extenfive province of ancient Dacia, or Ulterior Dacia, which the Romans had been unable to defend, oppofed, after it was become independent, a firm barrier againft the incurfions of the favages of the north, until the declining ftate of the Roman empire induced the inhabitants, after they had admitted fucceffive hordes of barbarians into their country, to iffue out occafionally from their woody retreats. They croffed the Danube in their light boats, and marked their inroads into the Roman provinces with blood and ruin, even to the fuburbs of Conftantinople.

The treaty of peace which Attila, king of the Huns, dictated to Theodofius and the eaftern empire, A. D. 446, gave him the fovereignty of ancient Dacia; and he ftipulated, that, for the convenience of his Dacian fubjects, a fafe and plentiful market fhould be eftablifhed on the fouthern bank of the Danube.

After the death of Attila, and the extinction of his empire, Dacia became the feat of a new but tranfitory power, under Ardaric, king of the Gepidæ.

The countries of which ancient Dacia was compofed were afterwards governed by petty princes, under the protection of the kings of Hungary. Thefe princes, having formed alliances with the kings of Poland, affumed independency, but were at laft forced to furrender their countries as fiefs to Auftria and the Ottoman Porte. Temefwar and Tranfylvania are now confidered as parts of the Auftrian dominions; and Moldavia and Wallachia are tributary to the Ottoman Porte, but are at prefent invaded by the Ruffians, and likely to be fevered from the Turkifh empire. See Moldavia, Wallachia, Temeswar, Transylvania.

DACIER, Andrew, in *Biography*, was born at Caftres in 1651; here alfo he received the early parts of his education, and would probably have completed his ftudies in the fame college, had not the management of it fallen entirely into the hands of the Jefuits, a circumftance that induced him to remove to Saumur, where he received inftructions from Tannegui le Fevre, a man of great celebrity, whofe daughter Dacier afterwards married. Within two years of their marriage, they both renounced the Proteftant religion and conformed to the Roman Catholic faith. Dacier was firft publicly known as an editor of feveral of the Greek and Roman claffics, in which he was affifted by his learned wife.

wife. He tranflated the works of Horace into French profe; the meditations of Marcus Antoninus; the Poetics of Ariftotle; fome of the Tragedies of Sophocles; the Manual of Epictetus, and the lives of Plutarch. As a tranflator he was an enthufiaftic admirer of the original authors. He engaged in a controverfy with Perrault concerning the merit of the ancients and moderns, but was not confidered as an able defender of the caufe in which he engaged as an advocate. He was admitted a member of the academy of Infcriptions, and afterwards was elected perpetual fecretary to the French academy. He was likewife keeper of the cabinet of Louvre; thefe facts prove better than a thoufand eulogia, that he was a man of great worth, and unfullied integrity. He died in 1722. He took a part in the Medallic Hiftory of Lewis XIV., for which he received a penfion. Moreri.

Dacier, Anne Le Fevre, wife of the preceding, and, as we have already obferved, daughter of Tannegui le Fevre. She was born at Saumur, in the fame year with her hufband; and was educated with the greateft care by her father. At an early age fhe became known as editor and commentator of fome of the ancient claffics in both languages. One of her firft productions fhe dedicated to the king, which he refufed to receive from the hands of a proteftant; the duke de Montaufier, who had introduced her to his fovereign, was feverely reprimanded for encouraging the profcribed fect; jealous, however, of his mafter's honour, he took the liberty of expoftulating with him, proving that he ought to be the patron of merit and talent, wherever, and among whomfoever found; and he added, that he would fend Mademoifelle Le Fevre a hundred piftoles in his majefty's name, which he might repay or not, as he fhould judge proper. This circumftance probably had fome effect upon the change of fentiments which M. Dacier and her hufband openly avowed foon after their marriage. She was a tranflator as well as editor. Ariftophanes, Anacreon, and Homer, were all rendered into French by this lady, fome of which have been frequently reprinted and difplay much merit. Notwithwithftanding the high reputation to which fhe attained in the literary world, fhe was far from laying claim to any fuperiority on that account: fhe was modeft and unaffected, but jealous of the honour of thofe ancient writers whofe merits fhe wifhed her countrymen to feel and acknowledge. She performed the duties of a wife and mother with exemplary affection, and exhibited in the lofs of a fon of great promife, and of a darling daughter, the fortitude of a hero, and the refignation of a true Chriftian. She died in 1720, much efteemed and regretted by all who knew her.

DACIO, in *Geography*, the laft village in the kingdom of Italy, on the borders of Switzerland, and more particularly of the canton of the Grifons near the lake of Chiavenna.

DACIRA, in *Ancient Geography*, a town of Mefopotamia; called by fome *Diacira*.

DACKENEM, or Dacquenem, in *Geography*, a town of Flanders, eight miles north-eaft of Ghent.

DACOLITHUS, in *Ichthyology*, a fpecies of *Cobitis*. See Cobitis *Tænia*.

DACRYDIUM, in *Botany*, (from δακρυ, a *tear*, or gummy diftillation from a tree.) Solander in Forfter's Pl. Efculent. 80, and Fl. Inf. Auftr. Prod. 92. Lambert Pin. 93. t. 41. Clafs and order, *diœcia monadelphia*. Nat. Ord. *Coniferæ*, Juff.

Gen. Ch. Male flowers forming an ovate terminal catkin. *Cal.* the fcales of the catkin heart-fhaped, pointed, bearing the anthers. *Cor.* none. *Stam.* Filaments none; anthers two to each fcale, tranfverfe, orbicular, of two valves. Female flowers on a diftinct plant, folitary, terminal. *Cal. Cor.* and *Style* unknown. *Nut* ovate, encompaffed at the bafe by a dilated, firm, cup-fhaped receptacle, and containing one feed.

Eff. Ch. Male. Calyx the fcale of a catkin, bearing two feffile anthers. Female. Nut ovate, feated in a cup-fhaped receptacle.

Dacrydium cupreffinum is figured in captain Cook's fecond voyage, tab. 51, under the name of the Spruce Fir of New Zealand. It is faid to form large forefts in the fouth-weft part of that country, to yield valuable timber, and to afford a kind of fpruce beer. The leaves are ever-green, fmall, crowded like thofe of a *Lycopodium*; the branches elegantly pendent. Its height is from 50 to 100 feet. *D. taxifolium,* another New Zealand fpecies, is mentioned by Hawkfworth in Cook's firft voyage, v. iii. 441, as refembling the Pitch Pine, and likely to make the fineft mafts in the world, if the trees could be lightened by tapping.

DACRYODES, in *Surgery,* a term applied to ulcers, which are continually yielding a putrid matter.

The word is formed from δακρυ, *tear*, and ειδος, *form*; denoting the ulcers to weep, or fhed fomewhat like tears.

DACRYON. See Tears.

DACTYL, Dactylus, a foot in the Latin and Greek poetry, confifting of a long fyllable, followed by two fhort ones: as *cărmĭnĕ*; and *tenderly, haftily,* in the Englifh language.

Some fay it is derived from δακτυλος, a *finger,* becaufe it is divided into three joints, the firft of which is longer than the other two.

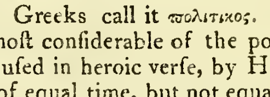
The dactyl is faid to have been the invention of Dionyfius or Bacchus, who delivered oracles in this meafure at Delphos, before Apollo. The Greeks call it πολιτικος. The dactyl and fpondee are the moft confiderable of the poetical feet; as being the meafures ufed in heroic verfe, by Homer, Virgil, &c. Thefe two are of equal time, but not equal motion. The fpondee has an even, ftrong, and fteady pace, like a trot: the dactyl refembles the nimbler ftrokes of a gallop. Paffages in which the dactyl abounds afford a found, which is evidently and intentionally an echo to the fenfe. Thus Homer (Odyff. l. xi.), after he has defcribed in labouring fpondees the flow and painful manner in which Sifyphus rolled the ftone up hill, makes ufe of nimble dactyls in defcribing its fwift defcent: thus,

" Αὖθις ἔπειτα πέδονδε κυλίνδετο λᾶας ἀναιδής."

And Virgil (Æn. viii. v. 595, 596.) defcribes in pure dactyls the galloping of the horfe: thus,

" ——— It clāmŏr, ĕt āgmĭnĕ fāctō
Quādrŭpĕdāntĕ pŭtrēm Sŏnĭtū quătĭt ŭngŭlă cāmpūm."

This term, in verfification, as much belongs to mufic as poetry, words frequently occurring in our language, (chiefly adverbs,) confifting of one long and two fhort fyllables; fo that mufical movements in common time, when bars compofed of one long and two fhort notes frequently occur, it may be called *Dactylic mufic,* fuch as Shenftone's paftorals generally require.



" Mȳ bānks thĕy wĕre fūrnĭfhed wĭth bēes,
Whōfe mūrmūrs ĭnvīte mĕ tŏ flēep."

Arne has fet thefe words admirably in Siciliana time.

See

See the 2d ſtanza of this paſtoral ballad.

"Nŏt ă pīne ĭn thĕ grōve ĭs thĕre ſeēn," &c.

Shenſtone, vol. i.

DACTYLETHRA, or Dactylithra, *Digitale*, among the *Ancient Phyſicians*, a medicine uſed to provoke vomiting. It was a ſort of topical application, and is deſcribed at large by Oribaſius.

DACTYLI, in *Antiquity*, a name attributed to the firſt prieſts of the goddeſs Cybele; who were particularly called *Dactyli Idæi*, on account of the goddeſs herſelf, who was ſtyled *Cybele Idæa*, becauſe principally honoured on mount Ida in Phrygia. The name *Dactyli* is ſuppoſed to have been given them on this occaſion: that to prevent Saturn from hearing the cries of Jupiter, whom Cybele had committed to their cuſtody, they uſed to ſing verſes of their own invention, which by their unequal meaſures ſeemed to reſemble the foot called *dactylus*.—This is the account of the grammarian Diomedes.

One Sophocles, quoted by Strabo, lib. x. ſpeaks differently. According to him they were called *Dactyli*, from the Greek word δακτυλος, *finger*, becauſe their number was at firſt equal to the fingers of the hand, *viz.* ten; five of them boys, and as many girls. He adds, that it is to them we owe the invention of iron, and the manner of working it, with divers other uſeful things, and for their uſeful diſcoveries, they are ſaid to have been worſhipped, after their death, as gods. Others make their number more, and others leſs than ten. Some, again, make them natives of Phrygia, near the foot of mount Ida; and others bring them from other places. According to Diodorus Siculus, they were the firſt inhabitants of Crete, who originally inhabited mount Ida, and paſſed from thence into Europe with king Minos. They ſettled firſt in Samothrace, where they taught the inhabitants ſacred rites, inſtituted ſacrifices, and introduced a ſet form of religious worſhip. Orpheus, who was naturally inclined to muſic and poetry, is thought to have been their diſciple, and the firſt who eſtabliſhed ſacred rites and ceremonies in Greece. However, all the authors Strabo had ſeen, he ſays, agreed, that they were the firſt who wrought in iron; that they had been miniſters of the mother of the gods, or Cybele; and that they dwelt at the foot of mount Ida: and they probably derived their knowledge of forging metals from the fuſion of minerals at the burning of mount Ida.

It is alſo conjectured by ſome authors, not that the Curetes and Corybantes were the ſame with the Dactyli Idæi, but that the Curetes and Corybantes were their poſterity; that a hundred men, born in Crete, were firſt called Dactyli Idæi; and that each of theſe had nine children, who were the Curetes; and that each of the Curetes had ten children, who were alſo called Dactyli Idæi. They were Cyclopians.

Strabo only gives us the names of four of the Dactyli Idæi, which are Salaminus, Damnanæus, Hercules, and Acmon. The learned Bryant, (Ancient Mythol. vol. i.) ſuppoſes that they were the ſame as the Curetes, Corybantes, Telchines, and Cabiri; which ſee reſpectively.

DACTYLIC, ſomething that has a relation to *dactyls*.

Anciently, there were dactylic, as well as ſpondaic flutes, *tibiæ dactylicæ*. The dactylic flutes conſiſted of unequal intervals; as the dactylic foot does of unequal meaſures.

Dactylic *verſes*, are hexameter verſes, ending in a dactyl, inſtead of a ſpondee; as ſpondaic verſes are thoſe which have a ſpondee in the fifth foot inſtead of a dactyl.

An inſtance of a dactylic verſe we have in Virg. Æn. lib. vi. 33.

"Bis patriæ cecidere manus: quin protinus omnia
Perlegerit oculis.——"

DACTYLIOMANCY, Dactyliomantia, a ſort of divination performed by means of a ring.

The word is compoſed of the Greek δακτυλιος, *ring*, of δακτυλος, *finger*; and μαντεια, *divination*.

Dactyliomancy conſiſted principally in holding a ring, ſuſpended by a fine thread, over a round table, on the edge whereof were made divers marks with the twenty-four letters of the alphabet. The ring, in ſhaking or vibrating over the table, ſtopped over certain of the letters, which being joined together, compoſed the anſwer required.

But the operation was preceded and accompanied by ſeveral ſuperſtitious ceremonies; for firſt the ring was to be conſecrated with a great deal of myſtery: the perſon who held it was to be clad in linen garments, to the very ſhoes; his head was to be ſhaved all round; and in his hand he was to hold vervain. And before he proceeded on any thing, the gods were firſt to be appeaſed by a formulary of prayers, &c. Ammianus Marcellinus gives the proceſs at large in his twenty-ninth book.

DACTYLIS, in *Agriculture*, is a term ſometimes applied to a ſpecies of cultivated graſs, the rough cock's-foot graſs (*Dactylis glomerata*.) It is a coarſe hardy rough graſs, but which has been found highly uſeful on moiſt loamy ſoils, where the bottom is of the retentive clay-marl kind; and where other finer graſſes are apt to be overpowered by the natural herbage. It requires to be kept cloſely fed down; under which circumſtances it conſtitutes an excellent early ſheep feed. See Grass, and Grass *Land*.

Dactylis, in *Botany*, (from δακτυλος, a *finger*, in alluſion to the ſhape of its ſpikes.) Linn. Gen. 35. Schreb. 50. Willd. Sp. Pl. v. i. 407. Juſſ. 31. Claſs and order, *triandria digynia*. Nat. Ord. *Gramina*.

Gen. Ch. *Cal.* Glume of two valves, containing one or more florets, forming an oblong compreſſed ſpikelet; its valves unequal, pointed, keeled, convex, and broader on one ſide. *Cor.* Glume of two valves, the lowermoſt largeſt, concave, acute, pointed or awned; the other cloven, lanceolate. *Nectary* a pair of lanceolate, pointed ſcales, tumid at their baſe. *Stam.* Filaments three, capillary, longer than the corolla; anthers oblong, cloven at each end. *Piſt.* Germen ovate; ſtyles two, ſpreading; ſtigmas feathery. *Seeds* ſolitary, oblong, naked, with a furrow on one ſide, clothed for a while by the permanent corolla.

Eſſ. Ch. Calyx of two linear-oblong, compreſſed, keeled, unequal valves.

This genus of graſſes is not one of the beſt defined. It ought to have but a ſingle floret in each calyx, as in *D. ſtricta*, Engl. Bot. t. 380; *D. cynoſuroides*, Linn; and *D. patens*, Ait. H. Kew; which are genuine examples of it; but *D. glomerata*, Engl. Bot. t. 335, has three or four florets, and has thence been judged, by ſeveral botaniſts, not a good *Dactylis*. No one, however, has ſucceſsfully referred it to any other genus, nor is it adviſable to form a new one of this ſpecies alone, the ſtructure of its fructification being by no means ſufficiently diſtinct from the above-mentioned ſpecies. The *D. glomerata* thrives under the ſhade of trees. We have in the above article mentioned its agricultural properties; but we have no authority to recommend it for any agricultural purpoſe. If uſed for fodder, it muſt be cut while young and tender.

DACTYLONOMY, Dactylonomia, from δακτυλος, *finger*, and νομος, *law*, the art of accounting, or numbering, by the fingers.

The rule is this; the left thumb is reckoned 1, the index 2,

2, and so on to the right thumb, which is the tenth, and of consequence is denoted by the cypher o.

DACTYLS, in *Botany*, denotes the fruit of the palm-tree, more usually called *dates*.

DACTYLUS, in *Antiquity*, a sort of dance among the Greeks, chiefly performed, as Hesychius observes, by the athletæ.

DACTYLUS, in *Zoology*, a species of Pholas, in the class of *Vermes Testacea*. See PHOLAS.—Also, a species of *Voluta*, in the same class. See VOLUTA.

DACTYLUS *Idæus*, in *Natural History*, a name given by many authors to the BELEMNITES; supposed erroneously by many to be the *lyncurius* of the ancients.

DADACARDIM, in *Geography*, a town of Asiatic Turkey, in the province of Diarbekir; 60 miles S. of Diarbek.

DADAI, a town of Asiatic Turkey, in the province of Natolia, 40 miles E. S. E. of Amasieh.

DADARI, a town of Hindoostan, in the country of Delhi; 52 miles W. of Delhi.

DADASTANA, in *Ancient Geography*, a town of Asia Minor, in Bithynia, at nearly an equal distance between Ancyra and Nice; where, according to Zosimus, the emperor Jovian died Feb. 17, A. D. 364. It separates Bithynia from Galatia, according to Arminianus Marcellinus.

DADDALA, a place of Asia Minor, in Lycia. Ptol.

DADDI, BERNARDO, in *Biography*, a painter, native of Arezzo, who was the scholar of Spinello, and became a member of the company of painters at Florence, in 1355. He painted the chapels of S. Lorenzo and S. Stefano dé Pulei, together with other works in the church of Santa Croce in that city. Little else is known of him except that he died in 1380. Baldinucci.

DADDI, COSIMO, a Florentine painter of the 16th and 17th centuries, who was a disciple of Batista Naldini, and was employed in many considerable works by the court of Tuscany. Amongst others he painted in the *Cortile* of the Villa of Petraja, the heroic actions of Goffredo Buglione at the taking of Jerusalem. The churches of Florence likewise possess several altar-pieces of considerable merit by his hand, and he was much esteemed for his portraits, which generally proved striking likenesses. He died at an advanced age, in 1630, having had the honour to instruct Baldassare Franceschini, called Il Volterrano, in the first rudiments of his art. Baldinucci.

DADELER, in *Geography*, a town of Asiatic Turkey, in the province of Caramania; 12 miles N. of Cogni.

DADEN, a town of Germany, in the circle of Westphalia, and county of Sayn, near which are some mines of copper; 8 miles S. of Siegen.

DADES PROMONTORIUM, in *Ancient Geography*, a promontory in the southern part of the isle of Cyprus, between the promontory Curias to the west, and that of Pedalium to the east. Ptol.

DADICÆ, a people who, according to Herodotus (l. viii. 66.) lived in the vicinity of Sogdiana; and who were armed like the Bactrians.

DADIVAN, in *Geography*, a plain of Persia, about 4 or 5 leagues in circumference, between Schiras and Lar, covered with trees of oranges, citrons, and pomegranates, to which the English and Dutch merchants of Ormus generally retire in the summer.

DADLEWALLET, a town in Africa, in the kingdom of Kontu.

DADO, in *Architecture*, the middle of a pedestal, or that part comprehended between the base and the cornice. In the pedestals of the orders this part has nearly a cubical form, whence it derives its name *dado*, Italian, for die.

DADO, in *Biography*, a fictitious artist, to whom several excellent prints of the 16th century, marked with a die, have been attributed. Many connoisseurs, however, consider these plates to have been the work of Niccolo Beatricetto. Heinecken.

DADOU, in *Geography*, a small river of France, in the department of the Tarn. It has its source near Saint Salvy, and runs into the river Agout below Lavaur.

DADUBRA, DADIBRA, or *Dadybras*, in *Ancient Geography*, an episcopal town of Asia Minor, in Paphlagonia.

DADUCHI, in *Antiquity*, priests of Ceres. See CERES.

That goddess, having lost her daughter Proserpine, say mythologists, began to make search for her at the beginning of the night. In order to do this in the dark, she lighted a torch, and thus set forth on her travels throughout the world: for which reason it is, that she is always seen represented with a lighted torch in her hand.

On this account, and in commemoration of this pretended exploit, it became a custom for the priests, at the feasts and sacrifices of this goddess, to run about in the temple, with torches, after this manner: one of them took a lighted torch from off the altar, and holding it with his hand, ran with it to a certain part of the temple, where he gave it to another, saying to him, *Tibi trado;* this second ran after the like manner, to another part of the temple, and gave it to the third, and so of the rest.

From this ceremony the priests became denominated *daduchi*, δαδουχοι, q. d. *torch bearers;* from δας, an unctuous and resinous wood, as pine, fir, &c. whereof the ancients made torches; and εχω, *I have, I hold.*

The Athenians also gave the name daduchus to the high-priest of Hercules.

DÆARA, in *Ancient Geography*, a place of Asia, near to Apamea and almost E. of it, and S.W. of Anthemusias.

DÆDALA, in *Antiquity*, two festivals in Bœotia, one of which was observed annually by the Platæans at Alalcomenus, where was the largest grove in all Bœotia. Here they assembled, and exposing to the open air pieces of sodden flesh, carefully observed whither the crows that came to feed upon them took their flight, and then hewed down all those trees on which any of them alighted, and formed them into statues, which by the ancient Greeks were called *dædala*, δαιδαλα.

The other solemnity was by far the greatest and most remarkable of the two, being celebrated only once in sixty years, in commemoration of the exile of the Platæans, which lasted that number of years. For the ceremonies observed in it, see Pausan. p. 302. in Bœot. and Pott. Archæol. Græc. lib. ii. cap. 20.

DÆDALA, in *Ancient Geography*, a country of India, the inhabitants of which abandoned it, and fled for shelter to the mountains, on the approach of Alexander the Great. The situation of this country, and also that of Acedera, which was deserted in the same manner, are not precisely ascertained. Ptolemy places a town of this name on this side of the Ganges, in the country of the Caspirians; lat. 30° 30'.—Also, a town of the island of Crete. Steph. Byz.—Also, a mountain of Lycia.—Also, a castle, according to Livy and Mela, or, as Pliny says, a town, of Asia Minor, in Caria, situated in the northern part of the gulf of Glaucus, N. of Cape Cria, about lat. 36° 50' or 55'. Stephanus Byzantius says, that Dædalus, being stung by a reptile, died

of the wound, and that this town, which was built in the place of his burial, took his name.

DÆDALEON Insulæ, two iflands of Afia, at the northern extremity of the gulf of Glaucus, on the coaft of Caria.

DÆDALIA, a town of Italy, founded by Dædalus, according to Steph. Byz., who fays that in his time it was called *Julia.*

DÆDALIUM, a place of Sicily on the fouthern coaft, S.E. of Agrigentum, and very near mount Ecnomus.

DÆDALUS, in *Fabulous Hiftory*, the great grand-fon of Erectheus, king of Athens, and grand-fon of Eumolpus, or Eupalamus, or, as Ovid fays, the fon of Eupalamus, was eminently diftinguifhed as the moft ingenious artift produced either in Athens or Greece. To him is afcribed the invention of the axe, the faw, the plummet, the augre, and glue, and alfo of mafts and yards for fhips. He alfo carved ftatues with fuch fkill, that they feemed to be alive, and would move or fly from one place to another, unlefs they were chained. Having liberally educated Talus, called alfo Perdix, the fon of his fifter, the ingenuity of his nephew, who is faid to have invented the turning-wheel, and other mechanical inftruments, excited the jealoufy of Dædalus, and induced him to put Talus fecretly to death. The murder being difcovered, the Areopagus of Athens condemned Dædalus capitally, or, as Servius fays, fentenced him to perpetual exile. But whatever was the nature of his fentence, he withdrew from Athens in difguife, and retired with his fon Icarus to Crete, where he was favourably received by king Minos. During his retreat in this ifland, he is faid to have conftructed the famous labyrinth at Gnoffus; and as he affifted Pafiphae, the wife of Minos, in her licentious amours, he and his fon were confined in this labyrinth; and finding no way of efcape, he made wings for himfelf and Icarus with wax and the feathers of birds, and faftening thefe wings to their fhoulders, Dædalus flew out of Crete into Sicily, but Icarus, difregarding his father's advice, and indulging the pride and wantonnefs of youth, foared too high, fo that the fun melted the wax that faftened his wings, and he fell into the fea, which, according to Ovid (Trift. 1.), has from this circumftance been called the Icarian fea. From his plaftic powers Lucretius deduces an epithet, which he applies to the earth, in order to defcribe its vernal vegetation:

> " —— Tibi fuaves, *Dædala* tellus
> Summittit flores."

DÆDIS, among the Greeks, a folemn feftival that lafted three days, during all which time δαδες, or *torches*, were kept burning, which gave occafion to the name.. The firft was in commemoration of the pains of Latona, when fhe was delivered of Apollo; the fecond was in honour of the birth of Glycon, and the gods; and the third in memory of the marriage of Podelirius and the mother of Alexander.

DAELIKER, Johan Rudolph, in *Biography*, a portrait-painter of fome eminence, who was born at Berlin in 1694. He afterwards fettled in Switzerland, and died at Schaffhaufen in 1769. J. J. Hard has engraved from this artift a portrait of Johan Gefner, M. D.; and another of Johan Cafper Landoff, conful of Zurich. Heinecken.

DÆMON, Δαιμων, a name the ancients gave to certain fpirits, or genii, which they fay appeared to men, either to do them fervice, or to hurt them.

The Greek word, δαιμων, is derived (according to Plato, in his Cratylus, p. 398. ed. Serrani, vol. i.) from δαημων, *knowing*, or *intelligent*; but according to others from δαιομαι, *to diftribute*. See the Scholiaft on Homer, Il. i. ver. 222. Eufebius (Præp. Evang. l. iv. c. 5.) deduces dæmons from δειμαινειν, *to fill men with terror;* and as in the Greek language ε is often changed into α, we have thus the origin of δαιμων, *dæmon*, denoting any invifible being that is an object of fear. Either of thefe derivations agrees with the office afcribed to dæmons by the ancient heathens, as the fpirits entrufted with the infpection and government of mankind. For, according to the philofophers, dæmons held a middle rank between the celeftial gods and men on earth, and carried on all intercourfe between them; conveying the addreffes of men to the gods, and the divine benefits to men. Plutarch de Defect. Orac. p. 415, *et feq.* Platon. Sympof. p. 202. tom. iii. ed. Serrani. Apuleius de Deo. Socrat. p. 674. 677. ed Delph. Iamblichus de Myfter. Auguft. de Civ. Dei.

It was the opinion of many, that the celeftial divinities did not themfelves interpofe in human affairs, but committed the entire adminiftration of the government of this lower world to thefe fubaltern deities. "Neque enim pro majeftate deum cœleftium fuerit, hæc curare." Apuleius de Deo Socratis, p. 677. "Cuncta cœleftium voluntate, numine & authoritate, fed dæmonum obfequio, & operâ, & miniſterio fieri arbitrandum eft." Id. p. 675. Hence they became the objects of divine worfhip. "If idols are nothing," fays Celfus (apud Origen. cont. Celf. lib. viii. p. 393.), "what harm can there be to join in the public feftivals? If they are dæmons, then it is certain that they are gods, in whom we are to confide, and to whom we fhould offer facrifices and prayers, to render them propitious."

Several of the heathen philofophers held, that there were feveral kinds of dæmons; that fome of them were fpiritual fubftances of a more noble origin than the human race, and that others had once been men. Apuleius de Deo Socratis, p. 684. 690. Ammonius apud Plutarch. de Defect. Orac. p. 431. tom. ii. ed. 1624. Plato in Timæo, p. 41, 42. 69. 71. 75.

Thofe who maintain the former of the above-mentioned opinions, allege that the primary gods, whofe exiftence was confidered as prior to the creation of man, and whofe original is always connected with the formation of the earth, the elements, and the heavenly bodies, are frequently ftyled dæmons by the ancient Greek writers, and more efpecially by Homer (Il. i. v. 222.); who, as Plutarch (de Orac.) obferves, indifferently ufes thefe two words, fometimes calling the gods dæmons, and the dæmons gods; and indeed he applies both terms in the fame fentence to one deity. (Il. xvii. v. 98.) The profe writers alfo ufe the term dæmon in the fame fenfe. Thus, Xenophon (Memorab. l. i. c. 4. l. iv. c. 3.) calls him the dæmon, who is able to difcern and regulate all things, both at hand and at the greateft diftance, in the fame moment, and with the utmoft care; and who fhews himfelf to be unwearied, perfect, incorruptible, adminiftering quicker than thought, and without error. The advocates of this opinion further obferve, that the fupreme deity of the Pagans is called the greateft dæmon; to which argument it has been replied, that notwithftanding the magnificent titles by which the Heathens defcribe their fupreme deity, they yet reprefent him as having a father and mother, a grand-father and grand-mother, and being of the fame kindred with the other gods of whom he was chief. See Homer's defcription of Jupiter in Iliad. i. v. 398. and Lucian. Deor. Dialog. apud Oper. vol. i. The other Heathen writers, and Hefiod in particular in his Theogony, give a fimilar

similar representation of Jupiter; ascribing to him the prerogatives, titles, and epithets of their supreme natural divinity; and at the same time clothing him with the weaknesses, vices, and all the properties of a human being: so that he sustained the two characters of a natural and of a hero-god. According to the Pagan system of theology, deified human spirits appear to have been associated with and to have represented the natural gods, and they were both called by the same names. The sun, æther, or air, or whatever other part of nature was esteemed the supreme deity of Pagans, was called in Egypt Osiris, in Chaldæa and Phœnicia, Bel or Baal; and in many other countries, Jupiter: and it is universally known, that Jupiter, Bel, and Osiris, had once been mortal men, who were supposed to be advanced after death to a deified state. For the same reasons, therefore, for which the chief Heathen numen was called Osiris, or Bel, or Jupiter, he might be called a dæmon; supposing the word to denote a deified human spirit; and it is said, that under this last character he was principally regarded by the common people. It has been said, however, that no decisive evidence can be produced in order to prove, that religious honours were ever paid to any deceased man, under the names of Bel, the supreme deity of the Chaldæans, or Osiris, the numen of the Egyptians, or that such worship was ever paid to a human spirit, under the name of Jupiter: and, indeed, it is certain that the Heathens worshipped many gods that had never been men. The Heathens, it is said, never considered any part of nature as their supreme deity; the Egyptians worshipped the sun and moon under the names of Osiris and Isis, and never paid any religious honours to hero-gods; and under the name Bel, who is said by Berosus to have formed the stars and the sun, the Chaldæans worshipped what had never been a man; as did also the Greeks, under the appellation of Jupiter.

It is farther urged by those who maintain the superior rank and nature of dæmons, that they are described as beings placed between the gods and men. But, on the other hand, it is argued, that this description respects not their nature but their office, as mediators between men and the celestial gods, and therefore agrees with such human spirits as were thought to be advanced to the office of dæmons. Jamblichus (apud Stob. Eclog. Physic. lib. i.) says, that good men were recompensed at death by being converted into angels and angelical souls, meaning the same as dæmons; and it is allowed by the learned, that Jamblichus, Hierocles, Simplicius, and others, use the word dæmons and angels indiscriminately. Hierocles says expressly (In Carm. Pythag.), that the middle kinds of beings were called indifferently angels, or dæmons, or heroes; and as the latter were human spirits, it is presumed that the former belonged to the same class. Philo says (De Gigantibus), that souls, dæmons, and angels, are only different names, but imply one and the same substance; and in another place (De Somn.) he affirms, that Moses called those *angels*, whom the other philosophers styled *dæmons*. It is farther argued, on the one side, that dæmons are expressly distinguished from heroes, who were the departed souls of men; and on the other, that dæmons were advanced to a rank and station superior to that of heroes, and that this difference occasioned the distinction. Accordingly those who adopt this opinion contend, that those dæmons who were the more immediate objects of the established worship amongst the ancient nations were human spirits, such as were believed to become dæmons or deities after their departure from their bodies. Plutarch teaches (Vit. Romul.), "that according to a divine nature and justice, the souls of virtuous men are advanced to the rank of dæmons; and that from dæmons, if they are properly purified, they are exalted into gods, not by any political institution, but according to right reason." In his book (De Defect. Orac.) he speaks of human souls as commencing first heroes, then dæmons, and afterwards advanced to a more sublime degree. He adds (De Is. et Osir.), "that Isis and Osiris were, for their virtue, changed from good dæmons into gods, as were Hercules and Bacchus afterwards, receiving the united honours of both gods and dæmons." These sentiments of Plutarch are confirmed by other writers, as Diodorus Siculus, and Pausanias in Corinthiac. l. ii. c. 10. Hesiod, and other poets, who have recorded the ancient history or traditions, on which the public faith and worship were founded, assert that the men of the golden age, who were supposed to be very good, became dæmons after death, and dispensers of good things to mankind.

This account of dæmons is fully confirmed by the other writings of the ancient heathens; and many passages have been cited from these writings by several learned men, particularly by Mr. Jos. Mede, and Dr. Sykes, in which dæmons must have the same meaning as in Hesiod. It is not pretended, that the heathens did not acknowledge and worship celestial or natural gods; for the description of dæmons as the more *immediate* objects of worship of itself implies, that there were *ultimate* objects of it, who could be no other than those celestial gods, whose agents and ministers the former were supposed to be. Moreover, it is supposed that some dæmons, or subaltern deities, either celestial or terrestrial, were acknowledged and worshipped in the nations to which the inquiry extends, and particularly among those that were in the most civilized and polished state, and even in most of those nations that were reckoned barbarous. Among the nations polished by learning we may reckon the Chaldæans, Babylonians, Syrians, Phœnicians, Egyptians, Greeks, Romans, and also such Arabians as bordered upon India and Egypt. That in these nations divine honours were paid to dead men and women is strenuously maintained by Mr. Farmer, whose researches on this subject have been very ample and various. Philo of Byblus, who translated the history of Sanchoniathon from the Phœnician language into Greek, has given in his preface to it, the following extract from his author "The most ancient of the barbarians, especially the Phœnicians and Egyptians, from whom other people derived this custom, accounted those the GREATEST GODS, who had found out things most necessary and useful in life, and had been benefactors to mankind. These they worshipped as gods; and, applying their temples to this use, they consecrated to their names pillars and statues of wood, which the Phœnicians held in high veneration, and instituted the most solemn festivals in their honour. More especially did they give the names of their kings to the mundane elements, and to other things to which they attributed divinity. For physical beings alone, such as the sun, moon, planets, and elements, and things of the same kind, did they acknowledge to be strictly and properly gods. So that some of their gods were MORTAL, and others IMMORTAL." Hence it is deduced, that the Phœnicians and other ancient nations, worshipped such men as had been benefactors to the human race. Moreover, Eusebius, who has preserved part of Philo's translation in his Præp. Evang. l. i., testifies, that, even to his time, deified men and women were the gods worshipped by all people, and in all cities and countries. It is farther maintained by the learned writer now cited, that heroes and gods of earthly origin were worshipped by the Egyptians. Hermes Trismegistus (*vid.* August. Civ. Dei, l. xxviii.

l. xxviii. c. 26.), acknowledged, that the gods of Egypt were dead men; that the art of making gods was invented in this country; and that human souls were worshipped as dæmons in every city. Herodotus, who had visited Egypt, and who had taken pains in informing himself concerning the religion of that country, records several instances of the worship of human spirits in that country; though they seem to have been overlooked by Dr. Blackwell, (Letters on Mythology, p. 209.) and Jablonski, (Pantheon Egypt. tom. 2. Prolegom. p. 37.) who affirmed, upon the supposed authority of this historian, that the Egyptians paid no religious honours to any gods of earthly extract. Herodotus has also recorded several facts, which serve to shew, that some at least of all the different orders of Egyptian gods were no other than men and women deified. From Diodorus Siculus we learn, that the Egyptians, besides the sun and moon, whom they called the *first* and *eternal gods*, acknowledged such as *were taken from the earth*; several of whom, he says, *had been kings of Egypt*, and *bore the same names with the celestial gods*, (p. 14. 17. Ed. Wessell.) He particularly specifies the eight great gods of Egypt, *Sol*, *Saturn*, *Rhea*, *Jupiter*, (called also *Ammon Juno*, *Vulcan*, *Vesta*, and *Mercury*). Isis and Osiris, the two principal divinities in Egypt, were, according to Diodorus, king and queen of Egypt; and he informs us, that Osiris conquered the most distant nations; that he deified his parents; and that he was himself deified in his turn, and had a third part of the lands appropriated to maintain his worship; and that after his death he received equal honour with that paid to the celestial gods. (p. 24.) From Plutarch (Is. et Osir.) we learn, that the priests affirmed, that the bodies of their gods, except such as were incorruptible and immortal, lay buried with them; and he gives us at large the history of the parentage of Isis and Osiris, their birth, their kindred, their exploits, and their death. Mr. Farmer has appealed to several other authorities, such as those of Plato, Lucian, Maximus Tyrius, Varro, Apuleius, and Lucan, in proof of the fact, that the worship of human spirits prevailed in Egypt. Upon the whole he concludes, that the Phœnicians and Egyptians, though they acknowledged elementary and sidereal deities, and asserted more especially the divinity of the sun and moon, did also worship human spirits; and that the Egyptians worshipped them under the distinct characters of heroes, dæmons, and gods. It farther appears, says this ingenious writer, that both the Phœnicians and Egyptians accounted their princes and eminent benefactors as *the greatest gods*. The twelve great gods of Egypt, in particular, as well as the CABIRI of Phœnicia and the eastern nations, were dead men deified. He infers from the testimonies which he has adduced, that deified men were the *immediate* objects of the public established worship in Egypt, as they also were in Phœnicia. He proceeds to shew, that the custom of deifying human spirits prevailed among the Assyrians, Chaldæans, and Babylonians. As the religion of Assyria and Babylon was derived from Egypt, which was probably the case, the former must have been in a great measure the same with that of the latter, which consisted, in part, in the worship of human spirits. The Chaldæan idolatry, called also the *Sabian*, consisted very much, at least originally, in the worship of the sun, moon, and stars, which were conceived to be severally animated by a soul, as the human body is; and, probably, they were also thought to be inhabited by the spirits of illustrious men. The chief god of the Babylonians was *Bel*, called by the Greeks *Belus*, answering to the Hebrew *Baal*, and to the Syrian *Beel*, and signifying *lord*. This term might therefore be applied to the true God; but it is commonly given in Scripture to those fictitious deities, who were falsely supposed to have dominion over mankind. Some have supposed that Bel, who was worshipped at Babylon, was the creator of heaven and earth, as the true God; but as the Babylonians had been for many ages before the time of Alexander, when Berosus, who has particularly mentioned Bel as having framed the world, &c., was the priest of Belus, were gross idolaters, they were not likely to worship the creator of heaven and earth; and some circumstances are related concerning this Belus, which are altogether inconsistent with this high denomination and character. Bel, indeed, was a name or title given to several princes; and more especially to the founder of the Babylonian empire. If he be, as some have supposed, the Nimrod of the Bible, he was ranked amongst the gods by the Persians, who succeeded to his empire; whence we may infer, that he was first worshipped at Babylon; and Eusebius informs us, that Belus, the first king of the Assyrians, was deified after his death. It is not to be inferred from the account given of Belus, that the term *Bel* was never explained physically, and applied to the sun, by learned men, as Osiris also sometimes was; for the ancients gave the names of their deified kings to the heavenly bodies. But the temple of Babylon was erected in honour of a man who founded the Babylonian empire, agreeably to the custom of the Heathens in the like cases. And this Belus was the god whom the Babylonians principally worshipped. (See BAAL, BAALIM, and BABYLON.) The Assyrians and Babylonians had several other gods of mortal origin, and it appears upon the whole, that dead men and women were the more immediate objects of the public devotion at Babylon, and were indeed honoured as their greatest gods. From the testimony of Lucian (De Dea Syr.) it appears, that the gods of Syria were of two sorts; the one visible, particularly the sun and moon; the other invisible, that is, human spirits, or such deities as corresponded to the idea which the Greeks had formed concerning those objects of worship that belonged to the human race, and were represented by statues; and we have sufficient reason for believing, that the Syrians deified dead men and women.

Mr. Farmer has traced at large the mythology of the barbarous nations, and cited a great number of testimonies and facts in order to shew that the worship of human spirits prevailed among the Scythians, the Massagetes, the Getes, the Goths, the Germans, the Persians, the Arabians, and the inhabitants of Meroe. This is also the case with regard to several barbarian nations in Africa, the Celtes both of Asia and Europe, and several nations of Asia. But for particulars we must refer to the author himself.

It is well known, and universally allowed, that the natural gods, the sun and moon in particular, were adored by the Greeks, as well as by the barbarians. It must also be admitted, that the Greeks worshipped the first founders of states and cities; those who died in defence of their country; and such as were greatly distinguished by their talents and exploits. But it is altogether unnecessary, in so plain a case, to produce the various proofs of the deification of men in Greece, which occurs continually in Herodotus, Pausanias, Plutarch, and other Greek writers. The law ordained, that the gods, the dæmons, and the heroes, should be worshipped according to their respective ranks. Mr. Farmer is of opinion, that the twelve great gods of Greece, or as they are sometimes called, the gods of the greater nations, were of human extraction. In proof of this opinion, he alleges the following arguments. 1. The Greeks derived their religion from Phœnicia and Egypt; especially from the latter. 2. The testimony of Herodotus, who was, without

without doubt, well acquainted with the Grecian objects of worſhip. This hiſtorian informs us (l. i. c. 131.) that the reaſon why the Perſians did not erect temples, altars, and images, to the gods (which the Greeks were known to do) "was, in his opinion, their not believing, as the Greeks did, that the gods are of the race of men." The ſtatues of the gods, in human form, ſays our author, were a proof of their having been men. The Greeks acknowledged the ſame natural gods as the Perſians did; but in Perſia they worſhipped the natural gods themſelves, directly and immediately; whereas, in Greece, the more immediate objects of the public worſhip were deified human ſpirits, to whom the adminiſtration of the government of this lower world was thought to be committed. And as theſe preſidents over nature did, as it were, intercept and engroſs the public devotion, Herodotus might juſtly ſay, in general terms, that the Greeks believed their gods were of human origin. And as Herodotus is here ſpeaking of the principal objects of Grecian worſhip, or of thoſe to whom the title of gods eminently belonged, who had temples, chapels, images, and altars, erected in their honour: he muſt therefore include the 12 great gods of Greece, and conſequently affirm, that they were dead men and women deified. 3. That the gods of the greater nations were deified mortals is a point partly eſtabliſhed by the "Sacred Hiſtory of Euhemerus of Meſſina." Euhemerus relates, that in one of his voyages, undertaken by order of Caſſander, king of Macedonia, he came to an iſland called Panchaia, and there found, in the temple of the Triphilian Jupiter, an authentic regiſter of the births and deaths of the gods, ſeveral of which are ſpecified by name, and mentioned by Diodorus Siculus, in a fragment preſerved by Euſebius. (Diod. Sic. Fragm. ad Weſſel. Euſeb. Præp. Evang. l. ii. c. 2. Cicero de Nat. Deor. l. i. c. 42.) The deſign of this "Sacred Hiſtory" was to ſhew, that the gods were to be regarded as mortal men. This hiſtory has been ſanctioned by the moſt reſpectable writers of antiquity: it was tranſlated into Latin, and approved by Ennius, Cicero, Diodorous Siculus, Euſebius, St. Auſtin, Lactantius, Minucius Felix, and Arnobius. But Euhemerus, it has been ſaid, was branded as an atheiſt: and this circumſtance has been urged to diſcredit the truth of his doctrine concerning the humanity of the gods. To this objection it has been replied, that no man was deemed an atheiſt by the heathens, if he worſhipped any gods who intereſted themſelves in the affairs of mankind, though they were only ſuch as had been men. So far, indeed, was the deification of men from implying atheiſm, that it rather preſuppoſed the exiſtence of the natural gods, with whom the deified men were aſſociated, and from whom they derived their power and authority. Hence it has been inferred that Euhemerus was not ranked among the atheiſts merely for aſſerting, that thoſe worſhipped by the people as gods had once been men. The charge againſt Euhemerus was his believing, that there were no gods, or none who take care of mankind. (Ælian. Var. Hiſt. l. ii. c. 31. Plut. de Placit. Phil. l. i. c. 7.) This charge, however, might be founded on his rejection of the received notion of the popular gods, juſt as Socrates, for a ſimilar reaſon, was deemed an atheiſt; and accordingly Sextus Empiricus informs us (Adv. Phyſicos, l. ix. c. 2. § 17.) that he repreſented their pretended deification as the mere effect of the pride and policy of princes and great men, in order to procure a higher veneration for their perſons, and a more ready ſubmiſſion to their authority. Moreover, Plutarch grounds the charge of atheiſm againſt him, not upon his aſſerting that the gods had been men, but upon his maintaining that they were nothing more than men long ſince dead. To this purpoſe Clemens Alexandrinus (Cohort. ad Gentes, tom. 1.) ſays, that Euhemerus and others were called atheiſts, "becauſe they had the ſagacity to diſcover the error of other men concerning the gods;" that is, they clearly ſaw they were not real divinities. The only plauſible objection, it is ſaid, againſt the hiſtory of Euhemerus, is that which Plutarch has urged, *viz.* that no one beſides this hiſtorian had ever ſeen the iſland of Panchaia. The exiſtence of this iſland, however, has been acknowledged by others, as Pomponius Mela, Diodorus Siculus, and Ptolemy Euergetes. Upon the whole it may be obſerved, that if the doctrine of Euhemerus, charged by Plutarch with ſpreading atheiſm through the world, and impugning the exiſtence of all the received gods without diſtinction, whom he deſcribed merely as ancient generals, admirals, and kings, be true, then even the great gods of Greece were men and women, who were, without any reaſon, ſuppoſed to become gods after death. Beſides, from a particular enumeration of the ſeveral Grecian deities, and an examination of their reſpective hiſtory, and of the character and attributes aſcribed to them, it is inferred that the origin of each of them was human. This was the caſe with reſpect to Jupiter, and of courſe as to the other gods and goddeſſes, who were of the ſame family, and of whom he was chief. In regard to the Greeks, it is concluded, that however they might acknowledge the natural gods, yet the dead men and women, whom they deified, were the more immediate and principal objects of their public worſhip. As the Romans derived their religion from Greece, Ægypt, and the Eaſt, it is natural to imagine that there ſhould be a conformity between their objects of worſhip, and thoſe of the other nations, in which dead men and women were deified. Accordingly we find that Æneas, from whom the Romans claimed deſcent, brought from Troy into Italy his houſehold gods, who were the ſouls of his departed anceſtors, and the great gods, who probably were the Samothracian deities, ſtyled "Cabiri," or great and powerful divinities, natives of Phœnicia. Hence it has been inferred, that, both in the country he had left, and among his own deſcendants in Italy, gods of human origin were worſhipped, and repreſented by ſacred images. Among other laws reſpecting religion, Numa ordained the following: "Let all honour the ancient gods of heaven, and thoſe whoſe merits have carried them thither: ſuch as Hercules, Bacchus, Æſculapius, Caſtor, Pollux, and Quirinus. (Cicero de Legibus, l. ii. c. 8.) To theſe ſix more may be added in later times, who are univerſally allowed to have been men, but who were eminently diſtinguiſhed from many other heroes, by being admitted into the community of the celeſtial or olympian gods. Numa required both theſe orders of deities to be worſhipped by the people: and hence it appears that the Romans acknowledged mortal gods. The law of Numa became a law of the 12 Tables, and remained in force in all ſucceeding times; whence it follows, that human ſpirits were, in every age, worſhipped at Rome, and even were the principal objects of the eſtabliſhed worſhip in that city; for the ancient gods of heaven, ſpoken of in the laws of the 12 Tables, were no other than the following 12 ſuperior gods of the Romans:

Juno, Veſta, Minerva, Ceres, Diana, Venus, Mars,
Mercurius, Jovis, Neptunus, Vulcanus, Apollo.

And theſe were the ſame with the 12 ſuperior gods of the Greeks, who were no other than deified men and women. Varro, the moſt learned of all the Romans, aſſerted, as St. Auguſtine informs us, that one would be at a loſs to find, in the

the writings of the ancients, *gods* who had not been men. Cicero contends, (Tusc. Quæst. l. 1. c. 12.) "that the whole heaven was almost entirely filled with the human race; that even gods of the superior order, or gods of the greater nations, were originally natives of this lower world, &c." (See also Cicero De Nat. Deor. l. i. c. 42.) Cicero's testimony is confirmed by St. Austin (Civ. Dei, l. viii. c. 26. c. 5.), who says, "You cannot find, or can hardly find, in all the writings of the Heathens, any gods but such as had been men; nevertheless, to all of them they pay divine honours, as if they had never belonged to the human race." It was upon the principles of the ancient theology that the Roman people deified their emperors; nor was this custom of deifying great princes an innovation of the Romans, but it was an old superstition, which prevailed to such a degree, that even the Christian emperors permitted themselves to be addressed, "as gods adored by the nations, to whom the world preferred their public and private vows." It has been farther argued, that the worship of human spirits prevailed among the heathens, from various testimonies of the ancients, and from certain uncontroverted facts. The heathen poets, whatever are the titles with which they dignify the objects of their established worship, do nevertheless record their birth, parentage, and kindred, and ascribe to them those passions, external forms, and various properties, which belong to human nature, and which subsist among mankind. (See Cicer. de Natur. Deor. l. i. c. 36. l. ii. c. 28. Tuscul. Disput. l. i. c. 26.) The worship appointed by the laws was conformable to the poetic theology, and founded upon it. Moreover, the painters and sculptors convey to us the same ideas of the heathen deities as the poets, for they represent them under human figures, both male and female.

If an appeal be made to the opinions of the philosophers, concerning the gods, they will be found to have been infinitely various. Nevertheless, we may deduce from their testimony what were the objects of national worship, and this affords sufficient evidence of the general worship of human spirits. Indeed, all the different sects of the philosophers establish this fact. The heathen historians not only bear testimony to the worship of human spirits in particular countries, but furnish general proofs of the prevalence of this worship among the ancient heathens. (See Diod. Sic. Fragm. tom. ii. p. 633. ed. Wessel. Polyb. Hist. l. vii. p. 572. ed. Casaub.) The learned Bryant (see Anal. Anc. Mythol. vol. i. p. 454, &c.), whilst he allows, that the Pagan gods were not only supposed by Christian writers to have been deified mortals, who were worshipped in the countries where they died, but that this was the opinion of the heathens themselves, the very people by whom these gods were honoured; yet contends that this was a mistake; and that most of the deified personages, mentioned by the Greek writers, never existed, but were mere titles of the deity, the sun. This hypothesis rests principally upon two grounds; one of them being etymological deduction, which is, in various cases, precarious and unsatisfactory; and the other, the writings of the Greeks, whose testimony he himself has taken pains to disparage.

If we examine the opinion of the Jews concerning the Heathen Gods, we shall find that the writers of the Old Testament, in particular, though they knew that the Pagans believed in sidereal and elemental deities, yet properly describe their gods as *dead* persons, because it was to such that the public worship was more immediately directed. In describing the Heathen gods as dead persons, they consider them as what they *really were*, not what they were *conceived to be* by their worshippers, for these regarded them as men advanced to divine power and dominion. (See Deut. xxvi. 14. Ps. cvi. 28, compared with Numb. xxv. 1, 2, 3. Is. viii. 19.) In contradistinction from these, the ancient prophets called Jehovah the only *living* God. (See Deut. v. 26. Josh. iii. 10. 1 Sam xvii. 26. 2 Kings, xix. 4. Jerem. x. 10. Dan. vi. 26, &c. &c.) The Jews, who were the authors of the Septuagint version, style the Heathen gods dæmons. (Deut. xxxii. 17. Ps. xcv. 6. Ps. cvi. 37.) The Christian fathers are very generally agreed in maintaining that all the Heathen deities had been men and women; so that it is needless to multiply citations from their writings to this purpose This, as Mr. Bryant allows, was the opinion of Clemens, Eusebius, Cyril, Tertullian, Athenagoras, Epiphanius, Lactantius, Arnobius, Julius Firmicus, and others; among whom we may reckon Cyprian, Minucius Felix, and St. Austin.

The opinion and testimony of the fathers seem to be of great weight in the determination of this question. They were bred up in the heathen religion, or lived in the times when it flourished; and therefore were as competent judges as the Heathens themselves could be. After critical examination they confidently pronounced the objects of national worship to be human spirits. They supported this opinon by arguments more than by the authority or concessions of the Heathens. And so clear and cogent were their reasonings, that idolaters deserted the worship of their false gods, and adored only the Creator of heaven and earth.

The testimonies already adduced, in order to prove that all the Heathen gods (except the deified parts and powers of nature) had been men, are confirmed by indisputable facts, and particularly by the nature of the worship paid to the heathen deities. If no argument can be drawn from the sacrifices which were offered them; yet their images, columns, shrines, reliques, altars, or grave-stones; and temples (which were their sepulchres) afford sufficient proofs, that the objects of public worship were such dead men and women as superstition deified. Even funeral rites were performed in their honour. As a just idea of the heathen gods is a matter of no small importance in its reference to consistent views of religion, and a satisfactory defence of the Scripture, we have extended this article beyond the usual limits assigned to subjects of this nature. By the account above given of the pagan gods, we are enabled to vindicate the censure passed upon them in the sacred writings. As to the parts and powers of nature which the heathen world deified, they are represented in scripture as the creatures of God's power, and the passive instruments of his decrees: nor can we forbear observing, that, at a time when the world was universally regarded as animated and divine, and the elements and the heavenly bodies were thought to possess an internal power to exert themselves in all their admirable effects, Moses discovered, published, and, by suitable miracles, confirmed the opposite doctrine. This doctrine, so perfectly agreeable to the principles of modern philosophy, and so remote from the sentiments and philosophy of his age, affords a strong presumption of his having received it by immediate revelation. As to the other gods of paganism, whether they were such human souls as became dæmons, or created spirits of a superior order, as some apprehend; the scripture (we conceive) gives us such a view of them as is inconsistent with their inspiring prophecies or working miracles. The sacred writers seem constantly to represent these gods as utterly impotent and insignificant; either as having no real existence, or no more power than if they did not exist. They call them "vanities," or things of no value or efficacy, and this degrading representation is extended to all of them without exception. (See Deut.

 xxxii.

xxxii. 21. 1 Kings, xvi. 13, 26. Jerem. viii. 19, x. 8. xiv. 22. xviii. 15. 1 Sam. xii. 21. Pf. xxxi. 6. xcvi. 5. Job, xiii. 4. Ifaiah, xli. See alfo Levit. xix. 4. 1 Chron. xvi. 26. Ezek. xxx. 13, and compare 1 Kings, xviii. 27. If. xlv. 5.) The apoftles of Chrift ufe the fame language concerning them with that of the ancient prophets. (1 Cor. viii. 4. x. 19.) The heathens, indeed, afcribed oracles, prophecies, and prodigies to their dæmons; and on their favour the good or evil ftate of men's lives was thought to depend: and this perfuafion was the ground of their worfhip. Hence it appears, that the proper point in difpute between idolaters and the prophets of the true God was, whether that perfuafion was fupported by facts. The meffengers of God challenge idolaters to juftify their worfhip of idols, and the idol gods themfelves to give proof of their divinity by a difplay of knowledge, or by fome exertion of power, fuch as was either hurtful or beneficial to mankind; and even admit that, by fuch a difplay of their power or knowledge, the heathen deities would have eftablifhed their claim to divinity, and their title to the homage of mankind. (See Ifaiah, xli. 21, 24.) Their utter impotence appears to be the only reafon of the Scripture's remonftrating againft paying them homage. Thefe circumftances are frequently repeated and juftified by facts. (See Jerem. x. 3, 5, 15. If. xliii. 8. xliv. 7. xlv. 16, 20. xlvi. 5. xlviii. 3. 1 Cor. viii. 4. x. 19. xii. 2. 1 Theff. i. 9. Dan. iv. 7. v. 7. 1 Kings, xviii.)

It has been afferted, and ftrenuoufly maintained by fome writers of approved talents and learning, that the fyftem of pagan idolatry was fupported by miracles and prophecies, performed and delivered, not by the fictitious deities of the heathens, but by "devils," or, wicked dæmons of a higher order than mankind, who perfonated the gods, lurked within their confecrated images and ftatues, infpired the vates, animated the fibres of the entrails of victims, governed the flight of birds, guided the lots, framed the oracles, and exerted themfelves to the utmoft in promoting idolatry, in order to involve men in the guilt of it, to draw all adoration to themfelves, to fecure proper food and nourifhment from the evil fteams and blood of the victims which were offered to them, and hereby to ftrengthen themfelves for the enjoyment of their luftful pleafures with boys and women. Thefe wicked fpirits, it has been afferted, were, properly fpeaking, the gods of the heathens, rather than thofe imaginary beings whom they feemed to themfelves to worfhip. In fupport of thefe affertions an appeal has been made to the writings of the fathers, and the authority of fcripture; and it muft be allowed that extravagant opinions of this kind are clearly contained in the writings of the fathers. (Juft. Mart. Apol. p. 113. ed Thirlbii. Tertullian de Anima, c. lvii. Minucius Felix, c. xxvii. Cyprian. de Idolor. Van. p. 206. Arnob. cont. Gent. l. i. 26. Lactant. de Orig. Error. l. ii. c. 16. de verâ Sapient. l. viii. c. 16. Eufeb. Præp. Evang. l. v. c. 4. Auguft. de Civ. Dei. l. viii. c. 16. See alfo Middleton's Free Enquiry, p. 66, 70, 77, and Mede's Works, p. 680, 681.) The Fathers, however, though they fometimes taught or allowed, that pagan idolatry was fupported by oracles and miracles, do neverthelefs on other occafions confefs, or clearly intimate, that paganifm had no other fupport than human craft and impofture. (Origen cont. Celfum. Eufeb. Præp. Evang. l. iv. c. 1, 2, 3. Clem. Alexand. Strom. Arnob. l. vi. Lactant. l. ii. See Fontenelle's Hift. of Oracles, c. ix. and Clerici Hift. Eccles. prolegom.) We have already fuggefted the improbability that the Scriptures fhould affert or allow that idolatry was fupported by the miraculous interpofition of any wicked fpirits; whether they did or did not counterfeit the fouls of men deceafed: and the fubject, as it is peculiarly interefting to the biblical critic, will be again refumed for farther difcuffion.

Dæmon is often ufed, in a general fenfe, as equivalent to a *deity*; and is accordingly applied to *fate* or *fortune*, or whatever elfe was regarded as a god; yet thofe dæmons, who were the more immediate objects of divine worfhip amongft the heathens, as Mr. Farmer maintains, and as we have already ftated his fentiments and reafoning, were human fpirits.

The word dæmon is ufed indifferently in a good and in a bad fenfe. In the former fenfe it was very commonly ufed amongft the ancient heathens, "We muft not," fays Menander, "think any dæmon to be evil, hurtful to good life, but every god to be good." Plato (Cratyl. tom. 1. p. 398. ed. Serrani) commends Hefiod and the other poets, who affirmed, that whenever any good man died "he became a dæmon." He elfewhere (de Republ. tom. ii. l. v. p. 468.) fpeaks to the fame purpofe. "All thofe who die valiantly in war are of Hefiod's golden generation, and become dæmons; and we ought for ever to worfhip and adore their fepulchres, as the fepulchres of dæmons." He affirms the fame concerning all who were judged excellently good in life, in whatever manner they die. The common or conftant ufe of dæmon in the earlieft ages, in a good fenfe, unlefs when κακος, or fome fimilar epithet, is joined with it, is owing, fays Mr. Farmer, to its being applied at firft to the deified fouls of good men; and if the firft dæmons were all good, as Dr. Sykes afferts, it is becaufe the firft men (whofe fouls they were), the men of the golden age, were all good: becaufe the heathens thought that the feparated fpirits of good and bad men became refpectively good and bad dæmons. Neverthelefs, thofe are certainly miftaken who affirm, that dæmon never fignifies an evil being till after the times of Chrift. Pythagoras held dæmons who fent difeafes to men and cattle. (Diogen. Laert. Vit. Pythagor. p. 514. ed Amftel.) Zaleucus in his preface to his laws (apud Stobæum. Serm. 42.) fuppofes that an evil dæmon might be prefent with a man, "to influence him to injuftice." The dæmons of Empedocles were evil fpirits, and exiles from heaven. (Plutarch Περι τε μη δειν δανειζεσθαι.) And in his life of Dion (p. 958.) he fays, "It was the opinion of the ancients, that evil and mifchievous dæmons, out of envy and hatred to good men, oppofe whatever they do. Scarcely did any opinion more generally prevail in ancient times than this, *viz.* that as the departed fouls of good men became good dæmons, fo the departed fouls of bad men became evil dæmons. See Chalcid. in Platon. Tim. cap. 135. p. 330.

Accordingly δαιμονιος frequently occurs in ancient writers as a term of reproach as well as of praife; whatever may be the opinion we adopt with regard to the nature and rank of dæmons. It has been very generally fuppofed, that dæmons, and particularly the bad dæmons, were fpirits of a celeftial origin; and this application of the term frequently occurs both among the heathens and in the fcriptures; and more efpecially in the writings of the Chriftian fathers. When no bad quality is afcribed to the dæmon, or dæmons that are mentioned, and nothing is affirmed concerning them which implies it, the acceptation of the term in Pagan writers is generally favourable. The Jews, and as fome fay, the facred writers, and alfo the Chriftian fathers, commonly ufed the term in a bad fenfe. But Mr. Farmer maintains, that, whether the term dæmon be ufed in a good or bad fenfe, there is no fufficient reafon for reftricting it to fpirits of a higher order than mankind. As the fouls of many good men,

men, he ſays, were thought to become good dæmons after death, ſo it was a prevailing opinion that the departed ſouls of many bad men became bad dæmons. Thales, Pythagoras, Plato, and the Stoics, as we learn from Plutarch (De Placit. Philoſ. l. i. c. 8.) repreſented "heroes as ſouls ſeparated from their bodies, and as being good or bad according to their reſpective characters." No notion, he adds, was more prevalent in the Heathen world, from the earlieſt ages, than that of the power of ghoſts to haunt and torment mankind, particularly the ghoſts of thoſe who died a violent death; and hence he inclines to believe that the doctrine of the philoſophers concerning evil men's becoming evil dæmons after death was the creed of the vulgar. From the Heathens the ſame or ſimilar opinions paſſed to the Jews, whoſe doctors taught "that the ſouls of the damned are for ſome time changed into devils, in order to be employed in tormenting mankind." (See Calmet's Dictionary, Art. *Dæmon*; Theophylact cited by Grotius in Matt. viii. 28.) Joſephus ſays expreſsly (De Bell. Jud. l. vii. c. vi. § 3.) "that dæmons were the ſpirits of wicked men." Aſmodeus (who is often deſcribed as the prince of evil ſpirits, and reckoned the very ſame as Sammael and Beelzebub) is repreſented by the Jews as having for his mother Nahemah, the ſiſter of Tubal-Cain. Some of them taught that dæmons were the offspring of Sammael (the prince of dæmons), and Eve, before Adam knew her. (See Calmet, *ubi ſupra.* Vandale de Idolat. Buxtorf's Lexic. Chald. Talmud. Baſnage's Hiſt. of the Jews, b. iv. c. 11.)

It is not eaſy to aſcertain, whether dæmon is uſed in a good or bad ſenſe in the LXX. If we could determine this point, we might infer how the term ſhould be underſtood in the New Teſtament, the writers of which have adopted the ſtyle and diction of the LXX. That it was uſed, at leaſt generally, in a bad ſenſe, ſeems to be probable for the following reaſons. Some of the Heathens themſelves inferred from the actions aſcribed to their gods, and the rites by which they were appeaſed, that they were not gods, but evil dæmons. (Plut. de Iſ. Oſir. De Defect. Orac. Compare Porphyr. de Abſtin. l. ii. § 36, 37. 42.) The Jews who wrote in the Greek language uſe dæmon in a bad ſenſe, particularly Joſephus and the tranſlator of Tobit, ch. iii. 8. vi. 17. Grotius (in Matth. iv. 14.) thought that the Helleniſts uſed δαιμων in an ill ſenſe, as the Hebrews did Baal; though both originally indifferent in their ſignification. Moreover the New Teſtament does certainly, on ſome occaſions, by dæmons mean evil ſpirits (Matth. x. 34. James, ii. 19.); and therefore the word may have the ſame meaning when it is applied to the heathen gods. Whatever notion we entertain concerning dæmons, in their reference to poſſeſſion, whether we ſuppoſe them to be ghoſts of wicked men deceaſed, or lapſed angels, it is plain they were conceived to be malignant ſpirits. They are exhibited as the cauſes of the moſt dreadful calamities to the unhappy perſons whom they poſſeſs, dumbneſs, deafneſs, palſy, madneſs, epilepſy, and ſimilar diſorders. They are frequently called πνευματα ακαθαρτα, unclean ſpirits, ſometimes πνευματα πονηρα, malign ſpirits. They are repreſented as conſcious that they are doomed to miſery and torments, though their puniſhment be for a while ſuſpended. It has been generally thought that by *dæmons* we are to underſtand *devils*, in the Septuagint verſion of the Old Teſtament. Accordingly the Iſraelites are charged by Moſes (Deut. xxxii. 17.) with the aggravated idolatry of ſacrificing unto *devils* (ſchedim), whom he calls "new gods that came newly up, whom they knew not, and their fathers feared not;" and the pſalmiſt (Pſ. cvi. 37.) reproaches them in ſimilar terms; "Yea, they ſacrificed their ſons and daughters unto devils" (ſchedim); and in another place (Pſ. xcvi. 5.) it is ſaid "all the gods of the nations are idols." In theſe three paſſages the term uſed by the Septuagint is δαιμονια. If all the pagan gods were devils, ſay Mr. Farmer, why are the *Schedim* diſtinguiſhed from their other gods? Why are they called new to the Iſraelites, who had of old worſhipped the pagan deities? (Gen. xxxv. 2, 4. Joſh. xxiv. 2.) Why is the worſhip of theſe *Schedim* mentioned as matter of peculiar reproach? And if theſe *Schedim* were devils, who have a real and extenſive power over mankind, why are they called *vanities* and *idols*? (Deut. xxxii. 2. Pſ. xcvi. 5. cvi. 36.) The word *ſchedim*, as this author ſays, is derived from a verb, which ſignifies to lay waſte, to deſtroy, and ought to have been rendered *the deſtroyers*. It expreſſes the ſuppoſed cruel nature and character of theſe falſe gods, who were thought to delight in, and who were accordingly worſhipped by, the deſtruction of the human ſpecies, and who required as appears from the context (Pſ. cvi. 38.) even "the blood of their ſons and daughters." Who the gods were that were worſhipped by human ſacrifices all hiſtory informs us; and ſo has the pſalmiſt in the moſt expreſs terms, "they ate the ſacrifices of the dead:" they were the great warriors who in their mortal ſtate delighted in the ſlaughter of the human race. This worſhip was new to the Iſraelites, as they had never practiſed it in Egypt or before they went into that country; but what they afterwards learned of the Canaanites. Accordingly the *ſchedim* are expreſsly called by the pſalmiſt (Pſ. cvi. 38.) "the idols of Canaan." What one circumſtance is there, adds our author, that can lead us to ſuppoſe that either Moſes or the Pſalmiſt, in the forecited paſſages, is ſpeaking of *devils*, in the common acceptation of that word? On the other hand, it is alleged that *ſchedim* is derived from a verb, which ſignifies to pour forth, to ſhed, to ſcatter abroad, and ought to be rendered *diſtributors*. Theſe were the idol gods of Canaan, *viz.* Baal, the ſun, moon, planets, and all the hoſts of heaven, as the ſcriptures repeatedly aſſure us; nor doth Moſes mention any other idol gods: whence, it is ſaid, it muſt be obvious to unprejudiced perſons, that the terms *ſchedim* in the Old Teſtament, and dæmons in the New, are applied to thoſe gods which had never been men, and cannot denote deified human ſpirits. (Fell's Dæmoniacs, p. 71.)

There is another paſſage in the Old Teſtament (Levit. xvii. 7.) in which our Engliſh tranſlators have introduced the word *devils*, "they ſhall no more offer their ſacrifices unto devils," לשעירם, to *ſeirim* or *ſchirim*, a word which ſignifies hairy beings, or goats. The learned Bochart has ſhewn, that the ſacred animals of Egypt were hairy, and that the goat in particular was worſhipped; ſo that, as the *ſchedim* were the idols of Canaan, the *ſeirim* were the idols of Egypt. That this was the caſe appears from another paſſage in which the ſame word occurs, *viz.* 2 Chron. xi. 15. But the word *ſeirim* (goats) no more ſignifies *devils* than any other word throughout the Bible. This prohibition of Moſes to the Iſraelites, after they had left Egypt implies, that they had, during their ſtay there, defiled themſelves with the particular ſpecies of idolatry here condemned. And the other paſſage, in which it is ſaid that Jeroboam "obtained him prieſts for the high places, and for the devils, and for the calves he had made," obviouſly denotes, that Jeroboam lately returned from Egypt, eſtabliſhed the worſhip of the deities of that country, which was eminently that of goats and calves, or at leaſt ſet up the images of theſe animals as ſymbols of the divinity. It could not refer to *devils*, in the ſenſe now given to the word, becauſe the Iſraelites are never charged by their prophets with ſo deteſtable a ſpecies of idolatry as the worſhip of devils; nor did the Egyptians, whoſe example Jeroboam copied, ever repreſent devils under the figure of goats and calves.

calves. Upon the whole Mr. Farmer concludes, that the authors of the Septuagint verfion muft have known that the Heathen gods, which were the immediate objects of worfhip, and which are repeatedly called dæmons, and not devils, were deified men; and what he has offered on this head is much confirmed by what occurs in fir Ifaac Newton's Chronology, p. 160, 161.

In the New Teftament alfo the Heathen deities are called dæmons; though the Englifh tranflation tends to miflead the reader by the ufe of the word devils inftead of dæmons, which the original imports; and hence, as well as from fome other collateral confiderations, it has been inferred, that the Heathen deities were fpirits of an order fuperior to that of the human race, and alfo that they belonged to the clafs of wicked fpirits. Thus we read in 1 Cor. x. 20, 21. "that the things which the Gentiles facrifice, they facrifice to *devils*, and not to God; and I would not that ye fhould have fellowfhip with *devils*;—ye cannot drink the cup of the Lord, and the cup of *devils*; ye cannot be partakers of the Lord's table and the table of *devils*." The word here rendered *devils* is δαιμονια or *dæmons*; but allowing this to be the cafe, it has been maintained that the word dæmon being ufed in an ill fenfe, the dæmons here referred to were apoftate angels. On the other hand, Mr. Mede and others are of opinion, that dæmons might have been taken in a good fenfe; and it has been fuppofed that the apoftle is defcribing, in this paffage, the objects of popular worfhip, and fpeaking of the notion which the Heathens in general had of them; thus "they facrifice to dæmons," that is, to fpirits whom they regard as real deities. But it has been faid, that if thefe dæmons were evil fpirits, they might neverthelefs have denoted deified men and women. How immoral were the characters, and how licentious was the worfhip, of thofe gods that were certainly of human extract, fuch as Jupiter, Venus, Bacchus, and many others? Ofiris or Serapis was the chief of evil dæmons (Plutarch, tom. ii. p. 362.) To thefe, it is faid, there may be a reference in 2 Cor. vi. 14—16; particularly in the expreffion, "what concord hath Chrift with Belial?" The Heathen dæmons might be called Belial, either becaufe they were of no ufe (deducing it from בלי, *nihil*, and יעל, which in Hiphil denotes *prodeffe*, or becaufe fo much wickednefs entered into the idea which the pagans entertained of them. St. Paul, it is alleged, was not unacquainted with the Greek learning, and it may be prefumed that he could not be ignorant of the ordinary fignification of dæmons amongft the Greeks. Nay, it is farther affirmed by Mr. Farmer, that he did know, that the Greeks by this word expreffed gods taken from among men. After preaching to the Athenians concerning the refurrection and glory of Jefus Chrift, they reprefented him as "a fetter forth of ftrange dæmons or gods;" (Acts, xvii. 18, 22.) which, as our tranflators have intimated, could not mean *devils*, in the ordinary acceptation of the term, but muft denote *deified men*; the Athenians imagining that St. Paul was recommending a new deity, who had once been a man. It cannot be fuppofed that in his addrefs to the Athenians, whom he wifhed to conciliate, and not to irritate, when he calls them δεισιδαιμονεστερυς, or very devout towards dæmons or the gods, he fhould brand them as worfhippers of devils; an affirmation of that kind not being true, nor likely to be underftood by the Athenians in that fenfe. In another paffage (1 Tim. xiv. 1.) St. Paul, foretelling the apoftacy of fome profeffing Chriftians from the purity of the original faith, fpecifies, among feveral other inftances, this very remarkable one, "their giving heed to doctrines" (not of *devils* but) "concerning dæmons." Here the apoftle evidently refers to the worfhip of *Saints* practifed by idolatrous Chriftians; as bifhop Warburton allows (Serm. vol. iii. p. 302.) though not in perfect confiftency with another declaration (Serm. vol. ii. p. 70.) "that the facred writers never ufe the word *dæmons*, but they always mean Satan and his angels." The meaning of the apoftle may be inferred from this paffage, which fhews that by the word *dæmons* he did not mean *devils*, but beatified or deified human fpirits.

The apoftle James fays (ch. ii. 19.), "The devils" (in the original, the dæmons) "believe and tremble." Here, fays Dr. Campbell, the apoftle means the fpirits of wicked men deceafed; and he further obferves, that in this epiftle, the epithet δαιμονιωδης is accordingly ufed in a bad fenfe, (ch. iii. 15.), where that wifdom which produceth envy and contention is ftyled earthly, fenfual, devilifh or dæmonian. Mr. Farmer fuggefts, that this paffage of St. James is taken from one in the book of Job (xxvi. 5.), the words of which he tranflates, "the giants tremble under the waters (or in *the abyfs*), *together with their* hoft or fellow-inhabitants." The word רפאים, he fays, fometimes fignifies the ghofts of the dead in general. (Pf. lxxxviii. 10. Ef. xxvi. 14.) In other paffages it feems to denote the ghofts of wicked men in particular, who are in a ftate of perdition; and more efpecially, perhaps, thofe of the giants who perifhed by the flood, and thofe who, like them, filled the earth with violence and terror. (Prov. ii. 18. ix. 18. xxi. 16. If. xiv. 9.). Rephaim properly fignifies giants in Gen. xiv. 5. Deut. ii. 11. 20. iii. 11. Jofh. xv. 8. xvii. 15. 2 Sam. xxi. 16. 18. 20. 22. 1 Chron. xx. 4. 6. 8. In the paffage cited from Job, it is explained concerning giants, that is, their ghofts in the Chaldee Paraphrafe, the Septuagint, the Latin Vulgate, and many modern verfions. In the phrafe "under the waters," Mr. Peters (Diff. on Job, p. 359.) and others, fuppofe that it refers to the waters with which the giants were overwhelmed at the flood. (See Mede Difc. on this text, Works, p. 31.). This expreffion, "under the waters," anfwers to the loweft hell, or fheol, in Deut. xxxii. 22. or that part of fheol which is allotted to wicked fouls. (See Peters on Job, fect. 8. Windet, de Vitæ Functorum ftatu, p. 204. 243.) Accordingly, Mr. Farmer apprehends, that the dæmons of St. James anfwer to thofe departed fouls in Job, whether you underftand thereby the ghofts of the wicked in general, or thofe of the antediluvian giants in particular. From this paffage he infers, that by dæmons in the New Teftament we are fometimes to underftand the ghofts of dead men. In another paffage (Rev. ix. 20.), he fuppofes it can bear no other meaning; where St. John refers to the idolatries practifed in the Romifh church, which confift in the worfhip of departed faints and fenfelefs idols, not of *devils*, as this word is now underftood. In the fequel of the revelation of St. John, he had a prophetic vifion of "the fpirits of dæmons working miracles," which is referred by fome to the miracles pretended to be wrought by departed faints, and in fupport of their worfhip, and underftood by others as a fymbol or figurative reprefentation of the deceit and fraud practifed by men of the temper and fpirit of dæmons, in fupporting their claims to a miraculous power. Another paffage occurs in the book of Revelations (ch. xviii. 2.), in which the utter defolation of Babylon is defcribed: "It is become the habitation of dæmons;" *i.e.* a defert; dæmons or evil fpirits being fuppofed to frequent defolate places, (compare the LXX. verfion of If. xiii. 21; and fee Vitringa on Rev. xviii. 2.)

Such as we have enumerated are the occafions on which dæmons, not directly referring to poffeffions, occur in the New

New Teftament; from a diftinct examination and illuftration of which, Mr. Farmer concludes, that the term dæmons never means in them the devil and his angels; but that dæmons denoted the ghofts of dead men; and that the word was ufed, as the ancients ufed it, fometimes in a good, and at other times in a bad fenfe. For the cuftomary ufe of the term in its connection with poffeffions, fee the article DÆMONIAC.

As to the meaning of the word dæmon in the fathers of the Chriftian church, it is ufed by them in the fame manner it was by the heathen philofophers, efpecially the latter Platonifts; that is, fometimes for departed human fpirits, and at other times for fuch fpirits as had never inhabited human bodies. In the fathers, indeed, the word is more commonly taken in an evil fenfe than in the ancient philofophers; and it has been a very general opinion, that by dæmons they meant fallen angels, as well as the fouls of dead men, both being objects of worfhip among the heathens. To this purpofe, Lactantius fays *(ubi infra)*, "Trifmegiftus calls dæmons evil angels; fo well was he acquainted with this, that they had been celeftial beings, but were depraved, and fo were become terreftrial." He alfo affirms "that there are two forts of dæmons, the one celeftial, the other terreftrial; that the latter are the authors of the ill things that are done, whofe prince is the devil, whom Trifmegiftus calls the dæmonarch," (prince of dæmons.) Chryfoftom (in Pf. xli. tom. v. p. 157.) reckons it among the favours of Providence, that when the air is full of dæmons and adverfe powers we do not difcern them; for the fight of them might frighten us out of our wits, if not to death. Eufebius of Cæfarea (Præp. Evang. l. vii. c. 16.) fuppofed thefe fpirits to be fallen angels; and he fays, that when they had finned, and for their tranfgreffion were expelled the heavenly abodes, many of them were thruft into hell, called the abyfs, and confined there; others of them were fuffered to dwell near the moon, and in the region of the air, &c.

Mr. Farmer, whilft he allows that the heathens believed in the exiftence of dæmons of a purely celeftial nature, fome of whom were evil fpirits, denies that the heathens worfhipped any fuch beings as we call fallen angels; and as to the opinion of the fathers, he obferves, that they conftantly maintain that Saturn, Jupiter, Serapis, Æfculapius, and all the heathen gods, had been mortal men; and that, therefore, they contradicted themfelves, when they afferted that they were a different order of beings. If they admitted that they had all been men, with what truth or confiftency could they call them fallen angels? Mr. Farmer conceives that the fathers borrowed this language from the Pagan philofophers: and both urge, in fupport of their affertion, that thofe beings whom the heathen world worfhipped as gods were evil dæmons, the fame arguments; fuch as the actions afcribed to the heathen gods, the rites appointed to placate them, and their oppofition to the caufe of true piety. Both taught that evil dæmons were fpirits of a celeftial origin, and that they were infpirers and authors of prophecies and miracles. As the fathers had been educated in the fchools of pagan philofophy, they would naturally adopt the fentiments and language of the philofophers, and retain them after they embraced Chriftianity. Neverthelefs, attached as they were, by early education or habit, to the pagan fyftem of dæmonology, fome of them maintained, and Juftin Martyr in particular, that dæmons were the fouls of dead men. This was alfo the cafe with regard to Athenagoras, Tatian, Tertullian, and others.

Befides the two forementioned kinds of dæmons, the fathers, as well as the ancient philofophers, held a third, *viz.* fuch as fprang from the congrefs of fuperior beings with the daughters of men. In the theology of the ancients, thefe were the worft kind of dæmons. (Tertullian's Apology, cap. 22. Lactantius, Div. Inftitut. lib. ii. cap. 14. 15.) Tertullian here refers to "the fons of God," in the hiftory of Mofes (Gen. vi. 2.), who mixed with the daughters of men, and who were believed to be angels by Juftin Martyr (Apolog. ii. p. 112.), Tertullian, and by almoft all the fathers of the four firft centuries, upon the authority of Jofephus (Antiq. i. 4.), Philo (vol. i. p. 263.), and the ancient editions of the Septuagint, which had fubftituted "the angels of God," inftead of "the fons of God."

Different orders of dæmons had different ftations and employments affigned them by the ancients. Good dæmons were confidered as the authors of good to mankind; evil dæmons brought innumerable evils both upon men and beafts. Amongft evil dæmons there was a great diftinction with refpect to the office affigned them; fome compelled men to wickednefs, others ftimulated them to madnefs. On the fubject of this article, fee, befides the original writers already cited, Banier's Mythology, vol. i. b. v. Blackwell's Letters on Mythology. Mede's Works. Farmer's Differt. on Miracles. Effay on Dæmoniacs. Worfhip of Human Spirits. Lardner's Works, vol. i. Bp. Newton's Works, vol. iv. diff. xv. See DÆMONIAC.

DÆMON, or *Genius of Socrates*, a fort of preceptor or monitor, whofe counfel and affiftance he is faid to have experienced in the chief concerns and actions of his life. This genius fuggefted to him what courfe it was proper for him and others to avoid, and diverted him, and thofe who regarded his advice, from the profecution of enterprifes which would have proved prejudicial, without ever prompting him to any particular action. Cicero (De Divin. l. i.) defcribes this dæmon as "Divinum quoddam, quod dæmonum appellat, cui femper ipfe paruerit, nunquam impellenti, fæpe revocanti." Plutarch and Apuleius have compofed feparate treatifes on this genius or dæmon of Socrates, in which they ftate the fentiments of the ancients concerning its exiftence and nature. As the deity alone has a clear and unerring knowledge of futurity, thofe who are the moft fagacious in difcerning the courfe and iffue of events, and their effect in contributing to the fuccefs or mifcarriage of any enterprife, approach the moft nearly to divinity, and feem, according to human judgment, to participate, in fome degree, the counfels and defigns, the forefight and prefcience of the deity himfelf; although their knowledge of futurity is conjectural and precarious, whilft his is certain and infallible. Socrates poffeffed a very confiderable portion of this fagacity, in the exercife of which he blended a juft and penetrating judgment with the moft confummate prudence. Accordingly he might denominate this kind of fagacity δαιμονιον, fomething divine, adopting a fort of equivocal expreffion, and modeftly declining to arrogate to himfelf the merit of his wifdom in conjectures concerning futurity. The abbé Fraguier, in a differtation on this fubject, printed in the fourth volume of the "Memoirs of the Academy of Belles Lettres," afcribes the whole of what has been faid concerning the dæmon of Socrates, to the wifdom and prudence of that philofopher, which enabled him to forefee many things which a perfon of inferior difcernment would never have thought of; for prudence, fays Cicero, is a kind of divination. If Socrates had not intended to decline affuming to himfelf the merit of an unerring judgment, by attributing it to a kind of inftinct; and if he had pretended to any extraordinary gift fuperior to

to that which is obtained from the divine wifdom by the fuggeftions of reafon, communicated in a higher or lower degree to all mankind, would he have efcaped, fays Xenophon (Memorab. l. i.), the cenfure of arrogance and falfehood? Thus, without mentioning any other inftances, when he appears before the judges who were to condemn him, that divine voice is not heard to prevent him, as it was upon dangerous occafions; the reafon is, that he did not deem it a misfortune for him to die, efpecially at his age, and in his circumftances. Every one knows what his prognoftication had been long before, upon the unfortunate expedition of Sicily. He attributed it to his dæmon, and declared it to be the infpiration of that fpirit. A wife man, who fees an affair ill concerted, and conducted with paffion, may eafily predict the event of it, without the aid of a dæmon's infpiration. It muft be allowed, however, that the opinion which afcribed to men genii and angels for directing and guarding them, was not unknown even to the pagans. Plutarch (De Anim. Tranquil.) cites the verfes of Menander, in which that poet exprefsly fays, "That every man at his birth has a good genius given him, which attends him during the whole courfe of his life as a guide and director." It may, therefore, be prefumed, that the dæmon of Socrates was nothing more than the force and rectitude of his judgment, which, acting according to the rules of prudence and with the aid of long experience, fupported by wife reflections, made him forefee the events of thofe things, with regard to which he was either confulted by others, or deliberated upon himfelf. Perhaps, at the fame time, he was not forry that the people fhould believe him infpired, or that he knew futurity by divine aid. That opinion might exalt him very much in the eftimation of the Athenians, and gave him an authority which the moft eminent perfons in the Pagan world highly appreciated, and which they endeavoured to acquire by fecret communications, and pretended conferences, with fome divinity; but it drew upon him the jealoufy of many of the citizens.

Dæmon *Thebaicus*, in *Zoology*, a name given by Hermann to the fhort tailed Manis. See Manis *pentadactyla*.

DÆMONIAC, Δαιμονιζομενος, one poffeffed by a dæmon. Dæmoniacs, or (if we may be allowed the expreffion) *dæmonized perfons*, were fuch as were thought to have a dæmon or dæmons *infpiring* and *actuating* them, fufpending the faculties of their minds, and governing the members of their bodies. The dæmons were fuppofed to inform the bodies of the poffeffed, in the fame manner that their own fouls did at all other times. Hence it came to pafs, that every thing faid or done by dæmoniacs, was often afcribed to the indwelling dæmons. Plato (apud Clem. Alex. Strom. i. p. 405. Oxon.) affirms, that "dæmoniacs do not ufe their own dialect or tongue, but that of the dæmons who have entered into them." Lucian when ftating the common opinion concerning perfons thought to be poffeffed, fays, "The patient is filent, the dæmon returns the anfwer to the queftions that are afked." And Apollonius thus addreffes a youth fuppofed to be poffeffed: ὀ σὺ ταῦτα ὑβριζεις, ἀλλ' ὁ δαιμων; I am treated contumelioufly by the dæmon, not by thee. Philoftr. vit. Apollon. p. 157. ed. Olear. Accordingly we find in the New Teftament, that what was faid and done by the dæmoniacs themfelves, is (in conformity to the vulgar language) very often referred to the dæmons by whom they were fuppofed to be infpired and actuated. And dæmoniacs having been educated in the common opinion concerning the nature and reality of poffeffions, did (as it is natural to fuppofe they would) frequently fancy themfelves to be poffeffed by dæmons, or that they were dæmons themfelves, and fpoke and acted in conformity to the apprehended fentiments and inclinations of thofe fpirits. Hence their dread of Chrift's power, and their treaties and expoftulations with him. See Farmer's Letters in anfwer to Dr. Worthington, p. 98, and p. 139.

The peculiar fymptoms of the dæmoniacs were certain kinds of infanity, fuch as the ancients could not account for by natural caufes, and feemed to argue the feizure of the underftanding by a malevolent dæmon, who inftigated the unhappy patient to every thing that was extravagant and injurious to himfelf and others. Among the Greeks, the Latins, the Jews, and other eaftern people, none were thought to be poffeffed whofe underftandings were not difturbed. Among the primitive Chriftians alfo, reputed dæmoniacs were all mad, melancholy, or epileptic perfons; and fuch likewife were all the *dæmoniacs* of the New Teftament; as is fhewn by Dr. Sykes in his Inquiry, and farther Inquiry concerning this fubject, and by Mr. Farmer in his Effay upon it, chap. i. fect. 5, 6. Both thefe writers have alfo taken much pains to fhew, that the dæmons to whom poffeffions were referred by the ancients were confidered, not as fallen angels, but as Pagan deities, which had once been human fpirits. To this purpofe they allege, that as poffeffing dæmons were in the age of the Gofpel univerfally regarded as human fpirits, it is very reafonable to fuppofe that the facred writers employ the term dæmon in reference to poffeffions, in the fame fenfe in which all other perfons did; efpecially as they have given us no notice of their ufing the word in a new or peculiar fenfe, and have even themfelves certainly ufed it on other occafions to defcribe fuch dead men as the fuperftition of the heathens deified, and corrupt chriftians have propofed as objects of worfhip. 1 Cor. x. 20, 21. 1 Tim. iv. 1. Rev. xix. 20.

The heathens, it is faid, having advanced human fpirits to the rank of gods or dæmons, judged them capable of entering the bodies of mankind, and of producing phrenzy and diftraction, which was regarded as the moft ufual effect of dæmoniacal poffeffion. Accordingly almoft all the heathen oracles belonged to that fpecies of divination which was by fury, fuch as was imputed to the power and prefence of their gods; and that thefe gods were deified men is inferred from the oracles of Jupiter, the chief of all the prophetic divinities, of Apollo, who had a temple at Delos, near the place of his birth, and who next to Jupiter excelled moft in the faculty of infpiring predictions; of Trophonius, Amphiaraus, and other men, who after death were tranflated to the gods. It is added that the terms employed by the Greeks, fuch as, θεοφόρητοι, θεόληπτοι, δαιμονιζομενοι, δαιμωνοντες, ευρυκλειται, &c. to defcribe perfons infpired, poffeffed, and difordered in their underftandings, ferve to fhew, that the fpirits by whom thefe perfons were thought to be actuated, were not fallen angels, but the gods worfhipped by the heathens; particularly fuch as were of human origin, or mere fictions of the imagination; and this was alfo the cafe with regard to the terms employed to defcribe the fame perfons by the Latins, fuch as lymphatici correfponding to the νυμφοληπτοι of the Greeks, bacchantes, fauni, cerriti, larvati, &c. Hippocrates, it is faid, informs us, that the Greeks referred poffeffion to their gods, particularly the mother of the gods, Neptune, Mars, Apollo, Hecate, and the heroes who were all human fpirits. What were the fentiments of the Jews concerning the fpirits, who were fuppofed to actuate mankind, appears from the exprefs teftimony of Jofephus, who was nearly contemporary with the apoftles, and wrote in the fame language. This writer fays in exprefs terms, (De Bell. Jud. l. vii. c. 6. §. 3.) that "dæmons are the fpirits of wicked men, who enter the living, and kill thofe who receive no help." In proof

proof of the contrary doctrine, and the opinion of the Jews, however, reference has been made to the language of the Phariſees, when they objected to Chriſt's cure of dæmoniacs: "He caſteth out dæmons by Beelzebub (Gr. Beelzebul) the prince of dæmons." For the ſtatement and examination of this objection, ſee the article Beelzebub.

It has been ſaid, however, that the term dæmon bears a different meaning in the ſacred writings, from that which belonged to it in the profane; or, that our Saviour and his apoſtles uſed it in a ſenſe peculiar to themſelves. To this argument it has been replied, that as the ſacred writers have not particularly explained the ſenſe in which they uſe the word dæmon, we may naturally infer, that they uſe it in its common and ordinary ſignification; and that if they had aſſigned to it a new and peculiar meaning, we might have expected that they would have apprized us of it for the prevention of miſtakes. For the general ſenſe of theſe ages, concerning the ſubject under our preſent conſideration, we cannot refer to a more reſpectable authority than that of Juſtin Martyr, who was bred a heathen, and inſtructed in the principles of the heathen philoſophy; and who afterwards became a Chriſtian, and flouriſhed near the times of the apoſtles, or about the middle of the ſecond century. This learned writer affirms (Apol. l. i. al. 2. p. 65. Par. 1620), "That thoſe perſons who are ſeized and thrown down by the ſouls of the deceaſed, are ſuch as all men agree in calling dæmoniacs and mad." From the caſe of the poſſeſſed this father infers the permanency of the human ſoul after death; and yet he ſeems to have believed in dæmons of a different order from thoſe who were of the human ſpecies. Accordingly he calls the devil a dæmon (Cohort. ad Græc. p. 87. ed. Oxon.), and ſpeaks of the devil's deceiving our firſt parents. With regard to the language of the New Teſtament on this ſubject, it has been aſſerted that the evangeliſt John ſeems to intimate (ch. xiii. 2.) that the *devil* took poſſeſſion of Judas; whence it has been inferred that as this was the language of the vulgar, it ſhews that, in their eſtimation, Satan and his angels did occaſionally enter the bodies of men. In another place, (Acts, x. 38.) we read of perſons that were healed, "who were oppreſſed of the *devil*," or held in ſubjection to the devil: whence it has been concluded, that to be poſſeſſed of dæmons, for to perſons in this ſtate the apoſtle ſeems to refer, and to be held in ſubjection to Satan, were expreſſions of the ſame import in the eſtimation of the Jews. With reſpect to the teſtimony of Juſtin Martyr, an ingenious writer obſerves, that he is pleading the cauſe of Chriſtianity againſt the worſhippers of dæmons, and that he ſeems to be deſirous of placing the objects of their worſhip in the moſt humiliating and contemptible point of view: and therefore in the diſcuſſion of this queſtion, we ought to regard him as an advocate, and not as exerciſing the authority of a judge. Joſephus, ſays the ſame writer, was a Jew, who held the pagan ſyſtem in the ſame contempt with which it was regarded by the Chriſtians; and whilſt he availed himſelf of an opportunity for degrading the objects of pagan worſhip, his words may be ſuppoſed to intimate, not that the ſpirits of deceaſed perſons only entered the bodies of men, but that all thoſe ſpirits which, under the name of dæmons, were adored by the heathens, were merely the ſpirits of deceaſed perſons deified by ſuperſtition. Joſephus and Juſtin Martyr, as we have elſewhere obſerved, (ſee Dæmon) ſeem to favour the opinion that fallen angels ſometimes occupied the bodies of men; for, they mean by angels (Antiq. i. 4. Apolog. ii. 112.) the fallen angels, or thoſe who, in the New Teſtament, are called the devil and his angels. Hence it has been concluded, that the indwelling dæmons of the New Teſtament were fallen angels; and that Beelzebub and the dæmons comprehend the devil and his angels, as well as the ſpirits of wicked men deceaſed. It muſt be allowed, whatever may be the ſentiments which we may adopt on this ſubject, whether we ſuppoſe the devil and his angels to be real or fictitious beings; and however we may extend or limit, admit or deny, the reality of their power and agency, that poſſeſſions were actually aſcribed by many of the fathers, after the time of Juſtin Martyr, to fallen angels. For their conduct in this reſpect, Mr. Farmer endeavours to account by the following conſiderations. Several philoſophers taught that the heathen dæmons were evil ſpirits of a rank ſuperior to mankind; and that theſe dæmons perſonated the ſouls of the dead, gods, and genii, and procured themſelves to be worſhipped under their names. In this opinion many of the fathers had been educated, and others adopted it from an attachment to the principles of ſome of the learned Gentiles. Motives of policy might likewiſe lead them to repreſent poſſeſſing dæmons as ſpirits of a higher order than mankind. Thus, whilſt St. Chryſoſtom (De Lazaro Conc. 2. tom. i. p. 728.) admits, that dæmons in poſſeſſed perſons pretended, that they were the ſouls of ſuch and ſuch a monk, he aſſerts that the devil perſonated the ghoſts of thoſe who had ſuffered a violent death, and thus cauſed men to think, that they became dæmons, that he might deſtroy the honour of the martyrs. By ſuch repreſentations they not only preſerved the credit of the Chriſtian martyrs, but contributed to diſgrace paganiſm, whilſt they repreſented its gods as devils, who perſonated theſe gods, and paſſed under their names. This view of the pagan gods ſerved alſo to diſparage the prophecies and miracles aſcribed to them by their worſhippers, and the reality of which was too haſtily allowed by the fathers. Mr. Farmer cites a number of paſſages, from which he infers that the fathers doubted or diſbelieved the reality of poſſeſſions, though they aſſerted it in their popular diſcourſes.

In the tranſlation of the New Teſtament in vulgar uſe, we frequently read of perſons *having* or *being poſſeſſed by a devil* or *devils*, and of Chriſt's *caſting out devils*. But the Scripture never deſcribes more than one evil ſpirit by the word devil; and never, (ſays Mr. Farmer), repreſents, any perſons as poſſeſſed by the *devil*, or by *devils*, not even in a ſingle inſtance, notwithſtanding the great frequency with which the evangeliſts ſpeak on the ſubject of poſſeſſions. In all the inſtances in which the term devil occurs in the Engliſh tranſlation of the New Teſtament, the original word is *dæmons* (δαιμονες, δαιμονια, δαιμονιζομενοι) and not that from whence comes the Engliſh word *devil* (διαβολος.)

In deſcribing perſons poſſeſſed the word δαιμων occurs only three times in the New Teſtament; once in each of the three goſpels, Matthew, Mark, and Luke; and in theſe three places it refers to the ſame poſſeſſion, *viz.* that of the furious man in the country of the Gadarenes, who haunted the ſepulchres. There does not, however, ſeem to be any material difference in this appellation from that of the diminutive δαιμονιον, which is alſo uſed by Luke in relation to the ſame dæmoniac. This term δαιμονιον occurs above fifty times, in reference to poſſeſſions real or ſuppoſed, and δαιμονιζομαι thirteen times. Whereas, it has been ſaid, the word διαβολος, *devil*, is never applied to poſſeſſion. The paſſage in the Acts in which thoſe "oppreſſed by the devil" are mentioned, and which we have already cited, ought to have been excepted.

It has, indeed, been generally apprehended, that dæmons and their prince are the ſame ſpirits with the devil and his angels. To which purpoſe it has been alleged, that Satan and Beelzebub are names for the ſame perſon; for when Chriſt was reproached with caſting out dæmons by

the affiftance of the prince of dæmons, he replied, "How can Satan caft out Satan?" (Matth. xii. 26. Mark, iii. 26. Luke xi. 18.) If Satan, it is faid, who is confidered as the fame perfon with the devil, (Rev. ix. 12. compare Matt. iv. 1. with Mark, i. 12.) was the prince of thofe dæmons who were caft out by Chrift, then dæmons are the fame fpirits as the devil's angels. On this fuppofition there can be no other difference between dæmons and the devil, than that which fubfifts between a prince and his fubjects, who both partake of one common nature, though the prince, as prefiding over the reft, hath a peculiar name of his own. To this objection Dr. Sykes, who maintained that dæmons and their prince were a different order of fpirits from the devil and his angels, never replied: and Dr. Lardner feems to admit its force; for he fays, (Cafe of the Dæmoniacs, &c. Works, vol. i. p. 448.) "The devil is often called Satan and Beelzebub." For an abftract of Mr. Farmer's reafoning on this fubject, fee the article BEELZEBUB. See alfo DEVIL and SATAN.

Whether there ever were any real dæmoniacs, is a queftion that will be confidered under the article DÆMONIACAL *Poffeffion.*

In the Romifh church, there is a particular office for the exorcifm of dæmoniacs.

DÆMONIACS are alfo a party or branch of the Anabaptifts, whofe diftinguifhing tenet it is, that the devils fhall be faved at the end of the world.

DÆMONIACAL POSSESSION. Whether we allow that reputed dæmoniacs were really poffeffed by dæmons or not, it muft be acknowledged that they are ranked in the New Teftament amongft thofe who fuffered the moft grievous diftempers. (See Matt. iv. 24. viii. 16, 17.) Hence it may be inferred, that poffeffions are comprehended under infirmities and fickneffes; and if they had not been included under difeafes, the mention of them would not have been omitted in Matt. xi. 5; confequently, poffeffions imply fome diforder or diftemper in the human frame, from whatever caufe it might proceed. It muft alfo be admitted, that the miracle, wrought upon the demoniacs, of the reality of which there can be no doubt, is often defcribed in the fame terms as that wrought upon the difeafed; and thefe terms are fuch as neceffarily imply their having previoufly laboured under a real diftemper, (fee Matt. iv. 24. viii. 16, 17. xv. 28. xvii. 16, 18. Luke, vi. 18. vii. 21. viii. 2. ix. 42. Acts, v. 16.) Whenever a miracle wrought upon a dæmoniac is defcribed, the evangelift fays indifferently, Chrift expelled the dæmon, or that he healed the dæmoniac; fo that a real diforder was cured, whenever Chrift is reprefented as ejecting a dæmon. Amongft the Greeks and Romans alfo, as well as amongft the Jews, thofe perfons who were thought to be poffeffed, fuffered grievous diftempers. Hence we may infer, that dæmoniacs were afflicted with certain diftempers, whether the poffeffion of dæmons was the real or reputed caufe of them. Moreover, an opinion feems to have very generally prevailed, both amongft the Heathens and the Jews, that evil fpirits or dæmons, (whether fallen angels or fouls of bad men) were the inftruments or authors of many afflictions and calamities to mankind. Madnefs, or diftraction, is one evil often afcribed to them. Forms of fpeech to this purpofe were very common. The nations bordering upon Judæa, as well as others, join infanity and poffeffion together. In the plays of Æfchylus, of Sophocles, of Euripides, and of Plautus, from which we may judge what opinions prevailed in common life, thofe who are fpoken of as poffeffed are all either madmen, or perfonate fuch. Befides madnefs, the ancients alfo afcribed epilepfy to poffeffion; efteeming this diforder facred on account of the entrance of dæmons into the bodies of thofe who fuffered under it. Mr. Farmer is of opinion that all the dæmoniacs fpoken of in the New Teftament were either madmen or epileptics. Poffeffion, he fays, referring to John, x. 20, 21, may be confidered as the caufe, and madnefs as the fuppofed effect; or madnefs was the evidence of poffeffion.

The language of this paffage is obvioufly grounded on the connection fuppofed to fubfift between poffeffion and infanity. (See alfo John viii. 48, 49. 51, 52. vii. 20.) Melancholy, as well as raving madnefs, was afcribed by the Jews to dæmons. (See Matt. xviii. 11. Luke vii. 33. See alfo the account of the Gadarene dæmoniacs in Matt. viii. 28. Mark v. 2. Luke viii. 27.) With regard to epileptics, it is obferved by the fame writer, that if their diftemper was by the ancients afcribed to poffeffion, it was becaufe it was attended with a deprivation of the underftanding, or lofs of fenfe, and with the figns of phrenfy. (See Matt. xvii. 25. Mark ix. 18. Luke ix. 33.). On the other hand, Dr. Lardner contends, "that all thofe faid to have evil fpirits were not difcompofed in their minds," in proof of which he refers to the cafe of the epileptic youth above-mentioned, that recorded in Mark i. 23. 26. Luke iv. 33., and the two inftances mentioned by St. Matthew (ix. 32.) and Matt. xii. 22. Luke xi. 14. In fupport of his hypothefis he alfo appeals to paralytic cafes; whereas Mr. Farmer maintains that paralytics are never fpoken of in the gofpel as dæmoniacs; and that the gofpel exprefsly diftinguifhes palfies from poffeffions. (Matt. iv. 24.) With regard to two other paffages, cited by Dr. Lardner, in one of which a woman is fpoken of whom "Satan bound" (Luke xiii. 11. 16.), and in the other all difeafed perfons are defcribed as "oppreffed by the devil" (Acts x. 38), Mr. F. obferves, that a diftinction fhould be made between diforders which the Jews confidered as *inflicted* by evil fpirits, and fuch as they afcribed to evil fpirits *poffeffing* mankind. Epileptics, it is faid, were by the Greeks and Latins called lunatics; but the evangelifts, as well as the ancients, diftinguifhed between dæmoniacs and lunatics, the former being maniacs, and the latter epileptics, the fits of whofe difeafes were fuppofed conftantly to return with every new and full moon. Accordingly Galen fays, "the moon governs the periods of epileptic cafes." However, many reputed the fame perfon to be both a dæmoniac and a lunatic; a dæmoniac, becaufe they referred the epilepfy to the poffeffion of dæmons, and a lunatic, becaufe the fits of this diforder were thought to keep lunar periods. While fome afferted the natural influence of the moon upon this diforder; others taught, that the patients were more fubject to the incurfions of dæmons at the changes of this planet than at any other time. Such, perhaps, was the cafe of the youth defcribed in the gofpel; for his father reprefents him both as lunatic and fore vexed with a dæmon; or he might have been what fome modern phyficians call "epileptic mad." (Mead, p. 46, 47.) The ancient Chriftian writers are faid to defcribe dæmoniacs as perfons difordered in their mind; and confidered them as mad, melancholy, or epileptic perfons. (See Mr. Jof. Mede, p. 30. Wetftein, vol. i. p. 283.)

Some writers have afferted, that there were no dæmoniacs, whether poffeffions be fuppofed to be real or imaginary, or not fo many amongft any other people as the Jews; nor amongft them, but about our Saviour's time. Hence unbelievers have taken occafion to triumph; and have conceived unfounded prejudices againft the gofpel, reprefenting it as fomewhat extraordinary, that the devil fhould exert his power at the appearance of his judge and avenger, rather than at any other time, when he might do it with greater hopes of impunity; and contumelioufly afking, whether or not we can regard

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Chriſt as the Saviour of mankind, if he gave the devil new powers to deſtroy them? In accounting for this ſuppoſed fact, they have ſuggeſted a variety of arguments. A greater liberty and power, ſay ſome of them, might be allowed the evil ſpirits, in the age of Chriſt than in any other, on account of "the intimate relation that dæmoniacal poſſeſſions have to the doctrine of redemption." (Warburton's Serm. vol. iii. p. 229) The biſhop alſo (p. 217.) concurs with Dr. Macknight, (Truth of the Goſpel Hiſtory, p. 169.) Stillingfleet (Orig. Sacr. p. 166.), in alleging other weighty reaſons for this fact, ſuch as the glory that accrued to God, and the teſtimony that was borne to Jeſus, when Satan was caſt out by a divine power. The learned Stillingfleet, indeed, is at a loſs to determine, whether frequent poſſeſſions, at and after the time of Chriſt, were owing to the malice of the devil, in order to *diſparage* the miracles of our Saviour, or to the providence of God, in order to *augment* his glory. Dr. Jortin thought that Providence ſuffered evil ſpirits to exert their malignant powers ſo much at that time to give a check to Sadduceiſm among the Jews, and to Epicurean atheiſm among the Gentiles. (Rem. on Eccl. Hiſt. vol. i. p. 14.) In another place (vol. ii. p. 17, 18.) he ſays, that Chriſt cured poſſeſſed perſons, in order to ſhew that he came to deſtroy the empire of Satan, and to remove all ſuſpicion of a confederacy with evil ſpirits. Theſe ſpirits, ſays biſhop Newton (Works, vol. iv. p. 302.), had at the time of our Saviour's appearance a particular reaſon for exerting their power and malice, in oppoſition to the firſt erection and eſtabliſhment of the kingdom of God; and they might be permitted to exert them to the utmoſt, in order more effectually to diſplay the ſuperior power and goodneſs of him whom God had ſent into the world, to render their defeat more conſpicuous, and to gain the greater credit to him and his diſciples. But it has been ſaid, that this reaſoning accounts for a fact, *viz.* God's permitting or forcing the devil to take poſſeſſion of men's bodies at the time of Chriſt, and at no other, which has no foundation to ſupport it. It ſhould be conſidered, however, that, many ages before the birth of Chriſt, and in other countries beſides Judæa, men aſcribed their diſeaſes in general to ſpirits. The account of dæmoniacs occurs, as we have already ſhewn, in the writings of more ancient and later dramatic poets, of hiſtorians, of phyſicians, and of philoſophers. The eſtabliſhed theology of the heathen world, from its firſt riſe to its final overthrow, reſted upon the baſis of dæmoniſm. With regard to the Jews, Joſephus informs us (Antiq. l. viii. c. 2. § 5.), that the method of exorciſm preſcribed by Solomon, "prevailed or ſucceeded greatly among them down to his time." The very exiſtence of exorciſts, both before and after the time of Chriſt, and the general prevalence of magic arts among this people, as well as among the Gentiles, are a full proof that a belief of frequent poſſeſſions was common to both; and, indeed, the ſcripture itſelf furniſhes abundant evidence, that the doctrine of poſſeſſions was prior to the Chriſtian era. (See Matt. xv. 21, 22. xvii. 15. Mark vii. 24. ix. 17. Luke ix. 39. Acts xvi. 16, 18. xix. 3.) It is obſervable, that the enemies of Chriſt never reproach him with introducing dæmons into Judæa, where they were not new or extraordinary, and occaſioned no ſurpriſe, merely for the ſake of diſplaying his power over them; nor on this account accuſe him of acting in concert with them, which, nevertheleſs, it would have been natural for them to do, if poſſeſſions had never been heard of till the time of Chriſt, and then only in Judæa. Some perſons have aſſerted, that the devil's tyranny expired, which is contradicted by numberleſs facts of real or ſuppoſed poſſeſſions, as well as revived, at the coming of Chriſt. Moreover, the dæmoniacs of the New Teſtament are the ſame ſort of perſons with thoſe mentioned in other writings, and, therefore, it is reaſonable to aſcribe the diſorders expreſſed by them, or pertaining to them, to the ſame or ſimilar cauſes.

Thoſe who deny the *reality* of poſſeſſions argue, that in the ages of ignorance and ſuperſtition, the credulous part of mankind were eaſily perſuaded to believe, that maniacs and epileptics were really poſſeſſed by dæmons; but that thoſe who conſulted their reaſon, and gained an inſight into nature, pronounced what commonly paſſed for dæmoniacal poſſeſſions, to be mere natural diſorders. The divine Hippocrates wrote his book, Περι Ἱερης Νοσȣ, to ſhew, that the epilepſy has nothing in it ſupernatural, more than any other diſtemper; and to expoſe the ignorance and impiety of thoſe who aſcribed it to the immediate agency of the gods, and accordingly undertook to cure it by expiations and charms. Amongſt many other conſiderations which he has urged to prove that epileptical diſtempers owe their riſe to natural cauſes, he obſerves, (De Morbo Sacro, p. 307. ed. Foeſii) "that goats are remarkably ſubject to the epilepſy; and, on diſſecting the head, the brain is found to be overcharged with a rheum of a very bad ſmell, a plain proof, he adds, that the animal is diſeaſed, not poſſeſſed by a deity."

Celſus (lib. iii. c. 18.) when treating of the ſeveral kinds of madneſs, takes no notice of dæmoniacal poſſeſſion, and aſcribes them to different cauſes. Plotinus, a Platonic philoſopher of the third century, ſpeaks of thoſe who pretended to cure diſorders by expelling dæmons, "as admired only by the vulgar," while they were deſpiſed by men of ſenſe, who believed, "that all diſeaſes proceed from natural cauſes." We learn from Origen (in Matt. tom. xiii. vol. i. p. 311. Huet. vol. iii. p. 577. Bened.) that phyſicians, in his time, accounted in a natural way for diſorders imputed to dæmons, though he condemned them for ſo doing. Many other inſtances might be mentioned to the ſame purpoſe. Dr. Mead (Med. Sacr. c. ix. p. 66, 67.) alleges, that the circumſtances related of the goſpel dæmoniacs are ſymptoms of natural diſorders, and do not exceed the powers of phyſical cauſes. It has been further argued, that as the ſeveral diſorders, imputed to poſſeſſion, proceed from natural cauſes, they alſo yield to natural remedies, and each of them requires a peculiar proceſs. It has alſo been urged, particularly by Mr. Farmer, that the human ſyſtem, like that of nature in general, is ſubject to invariable laws, ſuch as no being but God can controul. Indeed, he ſays, the doctrine of dæmoniacal poſſeſſions is ſo manifeſtly repugnant to the perfections of God, to the wiſdom, equity, and goodneſs of the divine government, and to that fixed order of cauſes and effects which we diſcover in every part of nature, and particularly in the human ſyſtem, that few perhaps in this enlightened age would appear in its defence, were it not from an apprehenſion that it is ſupported by the authority of revelation. He alleges, however, that whether the doctrine of poſſeſſion be true or falſe, it was not originally founded on revelation; and that it never received the ſanction of any of the prophets of the Old or New Teſtament.

The Old Teſtament, it is ſaid, is ſilent on the ſubject of poſſeſſions, and cannot be employed to eſtabliſh their reality. When Saul is ſaid to be "troubled by an evil ſpirit from the Lord" (1 Sam. xvi. 14. xviii. 10.), it is ſufficient to obſerve, that the word ſpirit is often uſed to denote the temper and affections of the human mind, and that the Jews were accuſtomed to call all kinds of melancholy an evil ſpirit. Accordingly, Saul's diſorder was a deep melancholy; and it was cured by muſic. As to the writers of the New Teſtament, they were not the original authors of the doctrine of poſſeſſions. In Chaldæa, Egypt, Greece, and all other countries,

tries, the doctrine of dæmons generally prevailed from the earliest ages. From the Gentiles it was transmitted to the Jews, not at Babylon only, but in every other place of their dispersion, and even in Judæa itself. But though this doctrine be not a discovery of revelation, it has been said, that various expressions used by Christ and his apostles are thought by some to assert or imply the reality of possessions. We are told, that the people brought to Jesus were such as were *possessed and vexed with unclean* spirits; and that he *cast out spirits with his word*. But perhaps these learned writers do not sufficiently consider, that the reality of possessions and dispossessions was never taught by Christ and his apostles as a doctrine; and that they could not, with propriety, interpose their authority in establishing the reality of possessions, considered as the secret cause of those disorders imputed to them; for the miraculous cure of these disorders being a part of that evidence which was assigned for the conviction of unbelievers, we are to judge of the nature of the miracle in question by reason alone, not by an authority which cannot be admitted previous to its performance. Besides, as possession by dæmons was anciently thought to produce some maniacal disorder; and the expulsion or departure of dæmons was thought to effect a removal of the disorder, or a recovery of the understanding; it hence came to pass that possessions and dispossessions were in common life used to express those outward and sensible symptoms they were thought to produce, or the *disorder* and *cure* of reputed dæmoniacs. It is very common to give to an effect the name of the cause to which it is ascribed. And whenever the supposed cause or author of any thing is put for the thing itself, the cause or author is not included. When Ceres, for example, stands for corn, and Bacchus for wine; corn and wine alone are intended. In like manner dæmoniacal possession was used merely to express madness, without taking the cause into the account. Josephus (Bell. Jud. lib. ii. cap. 13. sect. 4.) says, concerning certain demagogues, that "they persuaded the multitude to be possessed *by dæmons*," when his whole meaning was, "That the people were worked up into *a phrensy* by the artifices and eloquence of their leaders." Thus, amongst the moderns, *lunacy*, which at first denoted that peculiar kind of phrensy over which the moon was supposed to have an influence, is now used for phrensy in general. Nor are the evangelists to be blamed for describing the disorder and cure of dæmoniacs in the popular language, that is, by possessions and dispossessions; inasmuch as they might adopt the popular language on this subject (as they certainly have done on other subjects, and all other persons daily do) without designing to establish the doctrine on which it was originally founded.

So far, say the anti-dæmonists, is the Christian revelation from asserting the reality of dæmoniacal possessions, or representing it as a part of that doctrine which they were immediately instructed and commissioned by Heaven to publish and confirm, that this doctrine is contradicted by revelation. It is inconsistent, they say, with the fundamental principle both of the Jewish and Christian dispensations, with the proper evidence of miracles in general, and with the nature of that miracle in particular, which was performed upon dæmoniacs. What is the grand principle of the Jewish and Christian dispensations, but that Jehovah is the one true God, the sole Creator and Sovereign of the world, which he governs by fixed laws? Do not the Old and the New Testaments concur in referring to the immediate and miraculous agency of God alone, all effects which are contrary to that course and order of events, which he has established? If then there be no sovereign of nature but God, and no mediator between God and man but Christ, there can be no other superior intelligences, who have any power over the laws of nature, or over the human system in particular. Besides, all the prophets of God, in every age, when professedly delivering their messages to mankind, have with one voice proclaimed the utter impotence of dæmons, and hereby intirely subverted the doctrine of dæmoniacal possessions. Whoever, it is said, the heathen dæmons or deities were, whether human or angelic spirits, they are all, without exception, branded in Scripture as being utterly void of all power to do either good or evil to mankind. See Dæmon and Idol.

Did we not consider, says an ingenious writer on this subject, how far prejudice is capable of perverting the understanding, it must seem incredible, that Christians should form their judgment of the sentiments of the sacred writers concerning possessions by their descriptions of dæmoniacs, rather than by their professed doctrine concerning dæmons. If what all the prophets of God, under both Testaments, have taught us concerning the utter inability of dæmons or heathen deities to do either good or harm to mankind; if this doctrine be true, there never was, nor can be, a real dæmoniac.

The advocates of the *reality* of possessions have urged a variety of arguments in favour of their opinion. These we shall now, in as brief and concise a manner as is consistent with justice and candour, recite. If there was no agency of evil spirits in the time of our Saviour, it has been asked, how came this opinion so generally to prevail, and why should many persons have thought themselves to be possessed by evil spirits? To this argument it has been replied, that this is not the only instance in which unfounded notions have been very prevalent; and that the influence of dæmons in occasioning mental and bodily disorders had been acknowledged for a long time before our Saviour's appearance in the world. But notions of this kind had chiefly prevailed amongst the vulgar and least informed, and had been exploded, as groundless and fallacious, by persons of superior wisdom, reflection, and experience. However, whilst such sentiments prevailed, it was not unlikely, that some persons, who were afflicted with grievous distempers, should think themselves harassed and tormented by evil spirits, and occasionally speak in conformity to their inward apprehensions.

An appeal has been made to what is reported to have been said and done by the dæmoniacs themselves. Hence it has been concluded, that they were inspired and assisted by superior agents, such as dæmons are commonly supposed to be. Accordingly, it is pleaded, that the dæmoniacs knew, and proclaimed Jesus to be the Messiah. (Luke, iv. 34. 41. Mark, i. 24. Matth. vii. 29.) How, it is said, should these persons know Jesus to be the Christ, if they were not under the influence of evil spirits of great knowledge as well as much power? These dæmoniacs, it is said, who were either epileptics or maniacs, with occasional intervals of sanity, had the same means of knowing Jesus to be the Christ which others possessed. He was the object of universal attention; his fame had been propagated throughout all Judæa and the adjacent countries, and had excited a general persuasion that he was the Messiah. The dæmoniacs, before they were seized with their disorder, and in their intervals of sanity, might hear of the fame of Jesus as the expected Messiah, for they had many opportunities for this purpose; and it is suggested, that they might adopt the common opinion concerning his character as the promised Messiah, and declare that opinion more eagerly than persons of a cooler judgment: and this seems to be more probable, it is said, than that infernal spirits should freely and zealously assert the divine claims, and spread the glory of Jesus as the

Meſſiah. It has been further urged in ſupport of the reality of poſſeſſions, that Chriſt commanded the "devils (dæmons) not to diſcover him." (Mark, i. 23. 26. 34. iii. 12. Luke, iv. 33, 34, 35, 41.) To this argument it has been replied, that dæmoniacs were not only regarded by others, but generally conceived of themſelves, as ſpeaking and acting under the influence of the ſpirits by which they believed themſelves to be poſſeſſed, or as being thoſe very ſpirits. Hence the dæmon and dæmoniac were often confounded together; both being deſcribed under the ſame term, and the ſame act being referred indifferently to either. (See DÆMONIAC.) When the evangeliſts, therefore, tell us, "that Jeſus ſuffered not the *dæmons* to ſay, that they knew him to be the Meſſiah," they are to be underſtood of the *men* poſſeſſed by them. The ſame prohibition which he gave to the multitude, and to his own diſciples, he gave to them; becauſe their confident perſuaſion of his being the Meſſiah, and their gratitude to him for this miraculous relief, would prompt them to proclaim the high and honourable opinion which they entertained concerning him; and leſs guarded than others in their language and conduct, they would be more diſpoſed to publiſh their ſentiments. By checking their zeal, he might alſo wiſh to prevent any ſpecious pretence on the part of his enemies, that there was a ſecret agreement between him and thoſe evil ſpirits, who were judged to be ſo eager in applauding him. Some again have ſaid, that dæmoniacs could not be mere madmen, becauſe they argue with Chriſt in a very rational manner, and ſpeak to better purpoſe than the bulk of thoſe who were in their ſenſes. This aſſertion is chiefly founded upon the behaviour of the Gadarene dæmoniac: (Matt. viii. 28. Mark, v. 2. Luke, viii. 27.); and many reaſons have been ſtated by Mr. Farmer (Eſſ. on Dæmon. p. 260, &c.) in order to prove, that it did not warrant the ſuppoſition of his being directed and aſſiſted by ſuperior intelligences in all that he ſaid and did; but that it appears to be that of a madman according to the expreſs repreſentation of him in the hiſtory. In favour of the reality of poſſeſſions, it has been further alleged, that dæmoniacs exerted more than human ſtrength. (Mark, v. 3 [illegible].) To which it has been replied, that perſons in ſimilar circumſtances have at ſome ſeaſon exhibited uncommon ſtrength, and that the ancients were leſs ſkilful than the moderns in the methods of confining ſuch unhappy perſons. Another argument in proof of real poſſeſſions has been deduced from the deſtruction of the herd of ſwine which the dæmons are ſaid to have entered, and to have ſtimulated to inſtantaneous madneſs; which caſe has been conſidered as a deciſive evidence of the power of dæmons, both over the human and brutal race, and ſuppoſed to have been purpoſely deſigned by Providence, to convince us of this principle, and to refute the oppoſite opinion. (Matth. viii. 30. Mark, v. 11. Luke, viii. 32.) On the other hand, it has been alleged by Dr. Sykes and Dr. Lardner, that the ſwine were frighted by the two madmen, and ſo driven down the precipice into the ſea. Mr. Farmer, diſapproving the account of this fact given by theſe writers, as well as by the advocates of real poſſeſſion, maintains, that the men, if we take the words of the evangeliſts for our guide, neither drove, nor attempted to drive, the herd into the ſea. The hiſtory, he ſays, aſcribes the deſtruction of the ſwine, not to their being driven by the dæmoniacs, but to the entrance of dæmons into them, or to their being ſeized with the ſame diſorder from which the men were relieved, and which was thought to be cauſed by dæmons. Diſallowing the agency of dæmons, however, he ſuppoſes that the madneſs of the men was transferred to the ſwine by the immediate agency of God. This miraculous deſtruction of the ſwine he conſiders as a juſt puniſhment of the owners, who were probably Jews, and who were prohibited by the laws of Hyrcanus from keeping ſwine, and by the law of Moſes from partaking of their fleſh as food; and in this view of it, the miracle itſelf performed by Chriſt under a divine commiſſion, ſerved to manifeſt his regard to the law of God. The deſtruction of the ſwine ſerved alſo to aſcertain the *reality*, and to ſpread the *fame* of the miracle wrought upon the dæmoniacs. It was alſo adapted for correcting the falſe notions, concerning the power of dæmons, which were entertained in that age, as well by Jews as Gentiles, by both of whom Gadara was inhabited. Beſides, this miracle prevented ſeveral great inconveniencies that would otherwiſe have attended the miniſtry of Chriſt: *e. g.* the loſs ſuſtained by the Gadarenes prevented both Jews and Gentiles in thoſe parts from applying to Chriſt merely for the temporal benefit of his miracles, which was not their proper object, and which could not be diſpenſed to the Gentiles without increaſing the prejudices of the Jews; the behaviour of the Gadarenes in intreating Chriſt to depart out of their coaſts, ſeems to ſhew how indiſpoſed they were at that time to receive the ſpiritual bleſſings of the goſpel, and thus vindicates our Saviour in declining all familiarity with them; and the miracle, performed at the period of our Lord's higheſt popularity, ſtruck an awe upon the minds of the Jews, and in ſo doing prevented their raiſing tumults in his favour, as they were inclined to do, and their following him merely from worldly motives. With regard to this miracle, it may be further obſerved, that, though the diſpenſation of the goſpel, as a diſpenſation of mercy, was confirmed chiefly by miracles of mercy, it was nevertheleſs neceſſary that there ſhould be ſome examples of ſeverity, to check preſumption, and to warn men of the danger of rejecting a prophet, who was eminently the meſſenger of God's love, but at the ſame time the appointed miniſter of his juſtice.

After all, the moſt popular, the moſt plauſible, and the moſt perſuaſive argument in favour of real poſſeſſions is deduced from the language of Chriſt and his apoſtles, in performing and recording the cure of dæmoniacs, or in deſcribing the caſe of theſe unhappy perſons. From ſeveral paſſages of the New Teſtament, in which the mention of dæmons or dæmoniacs occurs, it has been inferred, that our Saviour and his apoſtles entertained and countenanced the doctrine of real poſſeſſions. If it was an error, the inſpired teachers of the goſpel, it is ſaid, muſt have known it, and ought therefore to have rectified it, inſtead of knowingly confirming the people in the belief of it. "It is impoſſible for me," ſays Dr. Campbell, "to deny the exiſtence of poſſeſſing dæmons, without admitting that the ſacred hiſtorians were either deceived themſelves in regard to them, or intended to deceive their readers. Nay, if they were faithful hiſtorians, this reflection, I am afraid, will ſtrike ſtill deeper." It is allowed, on the other hand, that our Lord and his apoſtles did uſe the common language of the age and country in which they lived on the ſubject of dæmoniacs, and that this language was originally founded on the ſuppoſition of the reality of dæmoniacal poſſeſſions. But, it is ſaid, that by uſing this language, they did not give their ſanction to the opinion from which it took its riſe. As neither the opinion nor the language originated with Chriſt and his apoſtles, they incur blame, if this ſhould be the caſe, merely for not departing from accuſtomed modes of expreſſion on this ſubject, and recurring to the uſe of new language concerning it. As they never aſſert the doctrine of poſſeſſions, but are thought, by thoſe whoſe ſentiments we are now ſtating, to have taught doctrines that militate againſt and ſubvert it, they muſt contradict themſelves, if by uſing the

common

common language with reſpect to dæmoniacs, they intended to countenance the opinion on which it was firſt grounded.

But it is maintained, that merely from the manner in which they ſpeak of reputed dæmoniacs, none can juſtly infer, that they deſigned to aſſert the reality of dæmoniacal poſſeſſions. Dr. Sykes and many others have obſerved, in reference to this ſubject, that it is cuſtomary with all perſons, and with the ſacred writers in particular, and with our Saviour himſelf, to uſe the language of the vulgar, though known and admitted to have been originally grounded on a falſe philoſophy. This kind of condeſcenſion and accommodation has been cuſtomary in a variety of caſes, that occur in common life; and it would argue an indecorous affectation and pedantry to abandon ordinary modes of expreſſion, eſtabliſhed by long and general uſage. When the ſacred writers, therefore, adopt the vulgar phraſeology, though grounded on an erroneous hypotheſis, we are not warranted in concluding, merely from this circumſtance, that they give their ſanction to ſuch an hypotheſis, or that they make themſelves reſponſible for its truth or falſehood; any more than the naturaliſt does, when he adopts vulgar expreſſions, and ſays, "the dew falls," "the ſun riſes, ſets, runs his race, or is eclipſed." Why then, it is ſaid, might they not adopt the common language, with reſpect to poſſeſſion, conſidered as the cauſe of a bodily diſorder? Can you infer their belief of poſſeſſions from their ſaying, that ſome "had dæmons," or "a ſpirit of Apollo," any more than you can learn a man's ſyſtem of philoſophy, from his ſaying, that his friend hath "St. Anthony's fire," or from his affirming that the ſun "riſes" and "ſets" every day? Moreover, Jews and Heathens, and even the ancient prophets, when ſpeaking of poſſeſſions, or on ſimilar ſubjects, adopt the common phraſeology, when they did not intend to countenance the opinion on which it was originally grounded; why, it is ſaid, might not this be the caſe with regard to Chriſt and his apoſtles? It is allowed, that, in ſome caſes, our Saviour and his apoſtles do uſe ſuch expreſſions, even on the ſubject under conſideration, as they could not deſign to have underſtood in a literal ſenſe, or in their fulleſt import. Thus, when they ſay, that one perſon was poſſeſſed by "ſeven dæmons" (Luke, viii. 2.), and another by "a legion" (Mark, v. 15.), is it not more natural to ſuppoſe, that they adopted the phraſeology of the Jews, in the ſame general ſenſe, than that they determined, by the aid of inſpiration, the preciſe number of dæmons, by which each of them was poſſeſſed? It was a very common opinion among the Jews, though not peculiar to them, that evil ſpirits frequent deſolate places, and this opinion is alluded to in the New Teſtament, (ſee Matt. xii. 43. Luke, xi. 24. Rev. xviii. 2.); but ſhall we repreſent him, who poſſeſſed all the treaſures of wiſdom and knowledge, as entertaining and ſanctioning this vulgar notion, becauſe he alludes to it, for the purpoſe of uſeful inſtruction, in his addreſs to the Jews? When he ſays on one occaſion, "Come out, thou unclean ſpirit" (Mark, v. 8.), and on another, "Thou dumb and deaf ſpirit, I charge thee come out of him" (Mark, ix. 25.); ſhall we hence infer, that he believed ſpirits to be dumb, deaf, and unclean? In another place (Luke, x. 18.), our Lord cannot be underſtood literally, when he declares, "I beheld Satan as lightning fall from heaven;" by which expreſſion he informs us, that he had a prophetic view of the ſudden overthrow of ſuperſtition and idolatry, (uſually deſcribed as the kingdom of Satan, or an adverſary,) or of the ſpeedy prevalence of true religion over every "oppoſing power." Hence, and from ſimilar inſtances, it is inferred, that merely from their deſcribing dæmoniacs in the common popular language, we are not warranted in concluding certainly, that either Chriſt or his apoſtles entertained the opinion to which that language owed its riſe. Dr. Lardner is of opinion, that the evangeliſts, at the time of writing their hiſtories, believed real poſſeſſions; but Mr. Farmer obſerves, that this can no more be inferred concerning *them*, from their mode of recording, than it can be inferred concerning *Chriſt*, from his manner of performing, the cure of dæmoniacs. It is further added, that Chriſt and his apoſtles had ſufficient reaſon for adopting the common phraſeology with reſpect to dæmoniacs, (ſuppoſing that they did not approve the hypotheſis on which it was grounded,) becauſe it was employed to deſcribe the real caſe of theſe perſons, the ſymptoms of their diſorder, and their cure. If we advert to the manner in which Chriſt performed cures upon the dæmoniacs, when he commanded the dæmons to come out, theſe commands, it is ſaid, manifeſtly ſuppoſe, that the beings to whom they are addreſſed are capable of obeying them, and that Chriſt expected them to obey him from a conviction and awe of his divine authority. But to this it is replied, that it was no unuſual thing with our Saviour to addreſs the elements, and other objects equally inſenſible, as agents endowed with reaſon and liberty. To the dead Jeſus ſaid, "Ariſe." He "rebuked the winds and the ſea," (Matt. viii. 26.) ſaying, "Peace, be ſtill." (Mark, iv. 39.) And he "rebuked a fever, and it left" the patient. (Luke, iv. 39.)

It is alleged further, in anſwer to the objection above ſtated, that the firſt publiſhers of the goſpel do not appear to have had any warrant for changing the vulgar language, in deſcribing the caſe of dæmoniacs; or that they were divinely commiſſioned to inſtruct mankind in the ſecret cauſes of the diſtempers which they were empowered to cure, and to rectify any phyſical miſtakes concerning them; nor, indeed, could they be commiſſioned for this purpoſe: for the miracles wrought on the dæmoniacs were deſigned for the conviction of unbelievers; and therefore their nature was to be determined by the teſt of reaſon alone, *before* men believed, *i. e.* before they could admit the authority of their performers, or pay any deference to their judgment.

The oppoſers of the common hypotheſis concerning poſſeſſions have pleaded, in vindication of Chriſt and his apoſtles for always uſing language conformable to that hypotheſis, that the prejudices of mankind in favour of the power of dæmons were very ſtrong, and almoſt invincible; and that if they had begun with an attack upon theſe prejudices, it would have prevented the converſion of multitudes, and led them to conceive of the firſt publiſhers of the goſpel as infidels and Sadducees. And it ſhould chiefly be conſidered, that their inſtructions did not directly extend to this caſe, nor could properly extend to it; the cure of dæmoniacs being a part of that evidence of the goſpel, which muſt for ever be judged of by reaſon alone.

The advocates of real poſſeſſions have further urged a conſideration of great moment, even in the eſtimation of ſome perſons who have adopted the contrary hypotheſis; and this is, that if their opinion be an error, Chriſt and his apoſtles ought to have corrected it; becauſe it was a very *dangerous* error, and the ſupport of much ſuperſtition and idolatry. This mode of reaſoning, it is argued on the other hand, indicates great preſumption, and ſeems to preſcribe to the wiſdom of God what he ought to do, and what kind and degree of inſtruction and evidence he ought to afford for correcting error, and promoting the belief of the truth. It is ſaid, however, that the firſt publiſhers of the goſpel have, in the moſt proper manner, rectified the dangerous errors that prevailed with regard to dæmons, and in ſo doing ſufficiently ſecured the intereſts of true piety. This they have done

done by their doctrine and by their miracles. As many idolatrous and superstitious practices have been grounded on a belief of the power of dæmons, the prophets of God under the New Testament, as well as those under the Old, have openly taught, what their miracles intimated, the utter inability of these spirits to do any good or evil to mankind. Bishop Warburton, and some others, have suggested, that an explicit declaration of Jesus or his apostles concerning possessions would have necessarily determined the judgment of Christians. But, such was the power of prejudice, and so rooted the error which prevailed, that a declaration of this kind might have been as ineffectual as it was improper. They have done, however, more than this; they have represented all dæmons without distinction as mere fictions of the human imagination, and demonstrated their nullity, and their total inability to produce any single effect. In rectifying the mistaken conceptions of mankind concerning dæmons, they have contributed to destroy, not one error only, but the whole fabric of Gentile idolatry and superstition. This was an object which their commission comprehended, and indeed was one principal intention of it. This was one end for which our Saviour appeared in the world. This was one of the distinguishing characteristics that pertained to him as the Messiah. He was announced previously to his advent, and he was expected by the Jews, as the destroyer of dæmons; and so decisive was this evidence of his divine mission, and of its grand object, that he himself appeals to it, and reasons from it in proof of his being a divine Messenger and Saviour. "If I cast out dæmons (says he) by the Spirit of God, then is the kingdom of God come unto you" (Matt. xii. 28.); *i. e.* If I restore dæmoniacs to their right mind by a divine power, the kingdom of the Messiah is certainly erected amongst you. Not satisfying himself with verbally denying the power of dæmons, he declares it to have been the design, he adduces it as an evidence, of his mission from God, that he should actually expose their impotence, and evince to mankind the folly of those apprehensions which were entertained concerning them. The ejection of dæmons, truly explained, affords one of those august displays and convincing proofs of the character of Christ as a Messiah and Redeemer, which were designed to recommend him to the veneration of mankind in all ages of the world.

DÆMONOLOGY. See DÆMON and IDOLATRY.

DÆMONOMANIA, in the *Pathology* of the older physicians, signifies that species of insanity or delirium, whether real or pretended, which was attributed to the agency of the devil, or of dæmons, on the bodies of the individuals supposed to be possessed, or to hold communication with them.

It is unnecessary, at the present day, to enter into arguments, with a view to confute the opinions that prevailed, in the ages of ignorance and superstition, respecting the effects and phenomena of dæmonical possession. See DÆMONIAC. It must now be generally allowed, that all those phenomena are explicable upon more obvious and satisfactory principles: and our wonder is excited, when we observe the minds of such enlightened men, as Frederic Hoffmann, so far influenced by the vulgar prejudices of his age, as to contend for the reality of such possessions, and to consider the following circumstances as proofs of their actual occurrence, namely, horrible noises, indecent gesticulations, and other unusual corporeal motions, as well as convulsions without any previous disease, blasphemous and obscene language, predictions of future events; the knowledge of foreign tongues; extraordinary strength, &c. (See Sauvage's Nosol. Method.) All these may be accounted for by a consideration of physical and moral causes, of ordinary occurrence: and, therefore, we cannot but refer the different species of dæmonomania, described by nosologists, to one or other of the following sources:

First, they are instances of true insanity, either mania or melancholy, or of the temporary delirium of intoxication. Such are the dæmonomania *fanatica* and dæmonomania *indica*, the fifth and seventh species of Sauvages. Nosol. Method. class viii. gen. 21. The history of fanaticism affords but too ample proofs of the madness of those who have unhappily fallen under its influence. See FANATIC. Sauvages mentions a set of fanatics, who believed that the artillery, by which they were inhumanly slain in crowds, would, in consequence of their religious zeal, play upon them with impunity. The dæmonomania *indica* is a temporary insanity, induced by the use of an intoxicating herb, under the influence of which the Malays, in the island of Ceylon, run furiously through the streets, armed with daggers, and stab indiscriminately whomsoever they meet, crying, *amok*, or *kill;* whence this maniacal paroxysm is termed by Europeans, "running a muck." See CEYLON.

Secondly, these supposed cases of dæmoniacal possession were, in other instances, the results of certain diseases, falsely attributed by the by-standers to the power of dæmons. Thus various convulsive symptoms, trismus, and tetanus, distortions of the body, screamings, delirium, &c. originating obviously from irritations in the bowels, or skin, or in the scalp, as from suppressed *plica polonica*, (Sauvages, sp. 8. also sp. 4. 6. and 9.) and ceasing with the removal of those irritations by cathartics, emetics, and other means, have been enumerated among the examples of dæmoniacal possession, and attributed to the charms and incantations of witchcraft.

But, thirdly, other instances of dæmonomania, and those amounting to no small number of the recorded examples, were decidedly deceptions; the tricks of designing persons, practising upon the credulity and superstition of the multitude. Such are the three first species of Sauvages: dæmonomania *sagarum*, dæmonomania *vampirismus*, and dæmonomania *simulata*. The opinion that certain persons, by a compact with dæmons, have obtained great powers over the lives and conditions of the rest of the world, and the consequent sensations, dreams and disorders, supposed to be thus produced, has been propagated among the ignorant and credulous, and in darker ages even among the comparatively enlightened portion of mankind, in several ways. These potent personages have, in some instances, effected their purposes, by exciting strong impressions on the mind; the influence of which on the body cannot be questioned, by those who are acquainted with the proceeding of the animal magnetizers, or the tractorizers, where the powerful aid of superstition was less employed. They have, at other times, employed certain narcotic drugs, which produce a great derangement of the nervous system, a temporary delirium, much dreaming, or a pleasurable sort of intoxication, when the operation of the excited imagination itself, as well as of the wizzard upon it, was attributed to the power of his diabolical agency. In later times, the Mesmers and De Mainaducs have employed the former means of deranging the animal economy, *viz.* by exciting strong impressions on the mind, without any pretensions to diabolical powers; and dæmonomania, therefore, though not in fact, is by name, an obsolete disease. See Cullen Nosol. Method. gen. 66.

DÆRSTETTEN, or DARSTETTEN, in *Geography*, a small town of Switzerland, or, as it is now styled, of the Helvetic republic, situated in the canton of Berne in the district of Wimmis. It had anciently a celebrated monastery of

of Auguftines, which in 1486 was incorporated with a monaftery of the fame order at Berne.

DÆSION, in *Chronology*, the Macedonian name for the Athenian month Anthefterion, which was the fixth of their year, and anfwered to the latter part of our November, and beginning of December. See MONTH.

DÆSITIATÆ, in *Ancient Geography*, the name of a people placed by Strabo in Pannonia, and by Pliny in Dalmatia, whofe chief was Baton or Bato.

DAFAR, DOFAR, or *Dolfar*, in *Geography*, a fea-port town of Arabia Felix, in the province of Hadramaut, on the weft coaft of a bay in the Arabian fea, to which it gives name, governed by a fcheik, who is a fovereign prince, and diftant 160 miles E. N. E. from cape Fartach. The chief export from this town is the incenfe called olibanum, which is much inferior in quality and value to that of India.

DAFFNI, in *Biography*, an ancient architect, who, together with Peonius of Ephefus, fabricated the temple of Apollo at Miletus, a marble building of the Ionic order, and celebrated for its beauty and magnificence. Milizia Mem. degli Architetti.

DAFFODIL, in *Botany*. See NARCISSUS.

DAFFODIL, in *Gardening*, is a plant of the bulbous rooted flowery ornamental kind, for the borders, clumps, and other parts of pleafure grounds. See NARCISSUS.

DAFFODIL, *Lily*. See AMARYLLIS and PANCRATIUM.

DAFFODIL, *Sea*. See PANCRATIUM.

DAFNE, in *Geography*, a river of European Turkey, in Bulgaria, which runs into the Urana between Marcenopoli and Varna.

DAFNE, in *Mufic*, the firft melodrama, after the invention of recitative, that was performed to this new kind of narrative mufic. It was written by Rinuccini, author of the firft great opera, Euridice, and fet by Jacopo Peri and Giulio Caccini, and privately performed at Florence in 1600, previous to the public performance of Euridice, the firft regular opera that was exhibited on a public ftage in Italy, on the nuptials of Henry IV. of France with Mary of Medicis.

DAG, in *Agriculture*, a term fignifying the dew hanging upon the grafs. It is chiefly applied when it remains long in the mornings upon the grafs-lands.

DAGANA, in *Ancient Geography*, *Thana-war*, a maritime town in the fouthern part of the ifland of Taprobana, which, according to Ptolemy, was confecrated to the moon.

D'AGAR, JACQUES, in *Biography*, a painter born at Paris in the year 1640. He became the difciple of Ferdinand Vouet, and acquired under that mafter fome fkill in hiftory-painting.

He however principally confined himfelf to portrait, and attained fuch reputation that he was invited to the court of Denmark, where he enjoyed the favour of Chriftian V. and of his fucceffor Frederick IV. He refided fome time in London, from whence he returned with confiderable wealth to Copenhagen, and there died in 1716.

D'Agar defigned with confiderable elegance, and his tone of colouring is pleafing and lively. His own portrait by himfelf is in the gallery of eminent painters at Florence. Pilkington.

DAGEBULLER KOEG, in *Geography*, a confiderable tract of land, gained from the fea in that part of Denmark which is called the duchy of Slefwick, belonging to the Prefecture of Tundern in the ifland of Fohr. See KOEG.

DAGELET, a name given by Peroufe to an ifland about 20 leagues diftant from the coaft of Corea, from the aftronomer who firft difcovered it. It fcarcely exceeds three leagues in circumference, is very fteep, and covered from its fummit to the water's edge with the fineft trees. A rampart of bare rock almoft as perpendicular as a wall entirely furrounds it, with the exception of feven fmall fandy creeks where it is poffible to land. On this ifland are fome huts, which neither formed a village nor were furrounded by any appearance of cultivation. Hence it is probable that the fhipwrights of Corea came hither in fummer with their provifions, to build boats, which they fell upon the continent. In the creeks of the ifland feveral boats were obferved upon the ftocks, conftructed exactly on the Chinefe model. The N. E. point of the ifland lies on N. lat. 37° 25′. and E. long. 129° 2′. from Paris.

DAGENHAM, a village of Effex, in England, on the banks of the river Thames, is remarkable for a fingular inundation, which happened near it in the winter of the year 1707. By an unufual fwell of tide, and a violent wind fetting up the river with it, a moft deftructive *breach* was made in its banks. A fmall fluice had been made for draining the land-floods, which being neglected, on the firft affault of the tides, blew up; by which an opening was formed in places 20 feet deep, and 300 feet wide. Through this extenfive channel the influx of waters was fo great, that upwards of 1000 acres of rich land were overflowed on the levels of Havermy and Dagenham; and the valuable foil of nearly 120 acres was carried into the Thames: by which a large fandbank was formed, reaching almoft half way acrofs the river. The danger thence arifing to its navigation occafioned an application to parliament for aid to effectually repair the breach, and a fmall tax was laid on veffels entering the port of London for defraying the expence. After an ineffectual attempt had been made under the direction of Mr. Bofwell, a contract was entered into with captain Perry, who had been employed under the czar Peter in erecting the city of Veronitz on the river Don. The work was commenced under this gentleman in April 1718. Previoufly to this period, frefh inroads had been made by the tide; and the breach rendered much worfe. After various expedients captain Perry fucceeded in effecting his purpofe, but not before the works had been three times nearly wafhed away by the rapidity of the tides. The original contract for this important work was 25,000*l.*; but before its completion, it appeared that 40,472*l.* 18*s.* 8¾*d.* had been expended. Of this fum 15,000*l.* more were afterwards voted by Parliament. Yet this left a minus to the able engineer of almoft five hundred pounds. Thus was he ungeneroufly left to defray part of the expence, after five years of exertion, anxiety, and care.

A pool ftill is left, as a memorial of the event, within the embankment, and near it a fmall houfe, fupported by the fubfcription of gentlemen, who form fifhing parties here during the fummer months.

While the men were digging in the works, an extenfive ftratum of various kinds of rotten trees, with a very little intermixture of earth, was difcovered beneath the furface. Among thefe were oak, hornbeam, hazel, willow, and yew; which latter were in an undecayed ftate. In this foffil ftratum, called *moorlogg*, feveral ftags' horns were alfo found lying on the furface.

It is a fact worthy of obfervation, that when this breach happened a vaft inundation alfo took place on the weftern coaft; by which all the moors of Somerfetfhire, in the vicinity of Bridgewater, were completely overflowed; much valuable land irrecoverably loft, and a new channel formed in the bed of Huntfpil river. See Perry's Account of the ftopping of Dagenham Breach, 8vo. 1721.

DAGERORT, or DAGEROTH, a fmall town on the extremity of the weftern promontory of the ifland of Dago in the Baltic, remarkable for a light-houfe which ftands about

about three miles from the fea, on a mountain computed to be 22 fathoms in perpendicular height.

DAGESTAN, Daghestan, or *Dagiftan*, a province of Afia, fituated on the weft coaft of the Cafpian fea, between the rivers Terek and Kur, or Circaffia and the province of Schirvan, inhabited by Tartars, and included in the government of Caucafus. This province includes four fmall ftates; the firft of thefe is the territory of the Schamchal, or Schabaal, ftretching about 14 German miles along the fhore of the Cafpian fea, from the river Kura-Koifu, a branch of the Koifu, called the dry Koifu, becaufe it is deftitute of water except when the fnow diffolves in the mountains, to the rivulet Urufai-Bulak or Ruffian Spring, and is in breadth from feven to eight German miles. The plain is moftly in tillage, and being well watered by rivers and brooks that defcend from the neighbouring mountains, produces corn. In this plain there are only fheds for cattle; the dwellings of the inhabitants being fituated in the mountains, which are covered with woods, fteep and interfected by many narrow glens. The capital is Tarki, fituated on the declivity of the mountain towards the plain, and faid to contain about 10,000 inhabitants, among whom are many Armenian and Georgian merchants: another lefs confiderable town, called Buinacki or Boinak, is fituated on a rivulet of the fame name, where it iffues from the mountains. The fecond ftate is the territory of the Uzmey, between the Urufai-Bulak and the little Darbach, which is for the moft part mountainous, about 8 German miles in length, along the coaft, and equally broad. It is watered by three pretty confiderable rivers, the Chamrafeni, the great Buam, and the great Darbach, which are divided into fmall canals for the purpofe of navigation, and alfo by feveral brooks. This tract of country produces abundance of wood and corn, and is well inhabited. The Uzmey refides in Bafchli, a fmall town feated on the brook of the fame name, at the diftance of four German miles from the Cafpian fea. On the rivulet Jntfché lies the town of Ottemifch, and many villages are fituated on the mountains. Along the banks of the Buam the inhabitants are Kaidaks; on the Darbach, Karakaidaks; and between the mouths of the great Buam and Darbach, Bereközes. The third ftate is the territory of Derbent or Derbend, which is of inconfiderable extent, being only four German miles in length on the fea-coaft, and extending from 1½ to 2 miles inland, and owes its importance folely to the advantageous fituation of the city of Derbend. The Darbach and Rubas form the northern and fouthern boundaries; between which rivers lies a broad and partly marfhy level, interfected by many fmall brooks, and interfperfed with beautiful and well cultivated corn-fields. For an account of Derbend, fee Derbend. The fourth ftate is Tabafferan or Tabäffaran, and lies between the Darbach and Rubas, towards their fources, extending about fix German miles inland from above the territory of Derbent, as far as the higheft ridge of the Lefgian mountains, which is very rocky and woody. Reineggs, in his "General Hiftorico-topographical Defcription of Caucafus," &c. vol. i. eftimates the ftrength of the different tribes that inhabit Tabafferan, who befides the Tartarian fpeak another language peculiar to themfelves, at about 10,000 families; and according to him the reigning family have held the fovereignty over the country for more than 600 years.

DAGGER, in *Military Language*, a fhort fword or poignard, about 14 inches long. This weapon is too frequently employed for the purpofe of affaffination, and in many parts of the world forms a part of the ordinary drefs of fome claffes. The dagger is feen under various forms; in Italy, the *ftiletto*, as it is there called, is fmall and eafily concealed; having generally a very fmall handle, and a flat, or a triangular blade, grooved very deeply. In the fouth of France, the *couteau* is more like that kind of knife ufed by our pork-butchers; in Spain, it is more on the Italian plan, and commonly worn in the waift, having a fmall ornamented handle. We had a dagger lately in the Leverian Mufeum, that had appertained to a monk, who committed various murders, fuppofed with that inftrument: it was concealed within the blade of a common table knife, in which it was retained, and could be drawn at pleafure, by means of a fpring in the handle. The Malays ufe daggers with ferpentine blades; thefe are called *creeffes*, and inflict a moft defperate wound; the extent of which, however, is rarely of moment, it being the cuftom of thofe people to ftab into the thorax, between the collar-bone and the *œfophagus*, or gullet. The Perfians, as alfo the people of Afia in general, confider the dagger as a part of their full-drefs, and wear fometimes two or more of them in their waifts. The handles of thefe are for the moft part ornamented with inlaid gold, or with precious ftones; and the fheaths are covered with velvet, tipped with gold ornaments. The gripe is formed in a curious manner, confifting of two crofs bars, at about an inch afunder, lying at right angles between two ftilts, that communicate with the blade; which is of a triangular form, and nearly flat. Daggers are prohibited by ftatute in this country, and happily are only to be feen upon the ftage, or in mufeums, &c. The wifdom of the legiflature was in this eminently confpicuous, fince it obviated a train of ferious mifchiefs naturally refulting from the immediate readinefs of laying the hand on an offenfive weapon. Hence, although the law makes allowance for the fatal iffue of fudden quarrels, where a weapon is *in the hand* of him who deprives another of life, it wifely exempts the dagger, as being, in itfelf, an indication of malice prepenfe, or of a criminal intention. In many parts of the continent, the lower claffes decide all their controverfies with knives or daggers; in the ufe of which many exhibit confummate fkill: it is, indeed, confidered there as much a fcience as our exercife with the broad-fword: trials of prowefs with blunt daggers, being a very common recreation.

DAGGIAL, the name given by the Mahometans to their falfe meffiah or antichrift, denoting a perfon with one eye and one eye-brow, who, as they pretend, will make his appearance at the end of the world, mounted on an afs, in imitation of the true Meffiah; but they further conceive, that Jefus Chrift, who is not yet dead, will then fight with him and put him to death.

DAGNO, in *Geography*, a town of European Turkey, in Albania, on the Drin; 15 miles S.E. of Scutari.

DAGO, Dagen, or *Dagho*, one of the fmall iflands of the Baltic fea, in the bay of Riga, belonging to Ruffia, lies nearly in the 59th degree of north latitude, and the 24th of eaftern longitude, exactly oppofite to another Ruffian ifland called Oefel, from which it is feparated by a fmall ftrait. It is diftant from the main land upwards of 18, and in fome places above 30 miles.

The ifland of Dago is of an oblong fhape, having a promontory, which extends weftward far into the fea; a fmaller one to the north-eaft, another to the fouth, and a fourth almoft due eaft. The others are lefs confiderable. Each of the four principal fides, which are not all quite equal, reaches in a ftraight line from about 25 to 35, and along the fhore, on account of its finuofities, to at leaft 48 miles. In regard to the main body of the ifland, the inhabitants reckon it in length from 30 to 36 miles, and 24 in breadth: but taking the promontories into the account, the right line from

from eaſt to weſt gives a breadth of 48 miles, and from ſouth to north a length of 36 miles. The weſtern promontory is about 18 miles long, and as many broad.

The paſſage from Livonia, the main land, to Dago is uſually either acroſs the iſland of Vorms, or paſſing by the little iſle of Hertholm ſouthward or northward. Many direct their courſe by the village of Vachterby, where a foreſt of alders, ſeen at a great diſtance, ſerves for a landmark. In ſummer time the paſſage is very ſafe acroſs the ſound, even in a ſmall boat: but numerous ſhallows, ſand-banks, and ſmall iſlands render the navigation about Dago ſomewhat perilous in ſtormy weather. Ships are often ſtranded here. At low water the ſand-banks reſemble iſlands: but after long weſterly winds they are overflowed.

No peſtilential diſeaſe was ever known to make any ravages at Dago. The population is ſo great that the eſtates are almoſt overburthened with vaſſals. In ſummer many of them go to the main land, and gain a livelihood by embanking, bricklaying, plaſtering, and frequently whole families are ſold. The landlords would derive no profit from their eſtates, if they were obliged to maintain their vaſſals, and as theſe cannot all live by agriculture, many turn their hands to various arts and handicrafts, in which they ſucceed uncommonly well. The majority of the country people are Eſthonians, though there are whole villages of Swediſh boors, Dago having been conquered, along with Livonia, by the Ruſſians from the Swedes, under Peter the Great.

The iſland of Dago is deficient neither in foreſts nor in ſtone. On the weſtern part is much ſand, but the ſouthern and eaſtern parts conſiſt of a blueiſh clay, and have therefore a fertile ſoil. A conſiderable quantity of good corn is produced, only the ſeed requires to be ſown ſomewhat early. Barley thrives well in rainy ſeaſons. The Swediſh counts De La Gardie were the principal proprietors in the iſlands, and four capital eſtates belong ſtill to one of their deſcendants, the counteſs Steinbock. Tooke's View of Ruſſia.

DAGOBERT I. in *Biography*, king of France, the only prince of that name that appears to have any claim to a place in this work, was ſon of Clotaire II., and born A. D. 602. At a very early age he was appointed, under the direction and aſſiſtance of the biſhop of Metz, and Pepin mayor of the palace, to the government of Auſtraſia. Upon the death of his father, in 628, he ſucceeded to the other parts of the kingdom, allowing, however, his younger brother a ſmall portion as his inheritance. Dagobert engaged in a war with the Sclavonians on the banks of the Danube, in which, at firſt, he was defeated, owing to the diſaffection of his own troops, but, at length, he became victorious, and repreſſed the incurſions of the Sclavonians. The Bulgarians put themſelves under his protection, and, through ſome apprehenſion of his own ſafety, he cruelly and infamouſly ordered 9000 of the people who looked to him for protection to be maſſacred. He extended his power, and the greatneſs of his fame gave him conſiderable influence among ſurrounding nations. His private life was, in the early part of his reign, truly exemplary; but he afterwards became extremely licentious, and, as he advanced in life, he hoped to atone for his miſdeeds by his zeal for the externals of religion, and by founding churches. Among theſe was St. Dennis, celebrated as the burial-place of the French monarchs. In this Dagobert was interred in the year 638. He has been praiſed by hiſtorians on account of his liberality to the church; but he better deſerves applauſe for collecting, reviſing, and making public the laws of his country. In religion, he partook of the bigotry of the times, and iſſued an order for all the Jews in his dominions to ſubmit to Chriſtian baptiſm. Moreri.

DAGOLASSOS, in *Ancient Geography*, a town of the Leſſer Armenia.

DAGON, in *Mythology*, one of the moſt celebrated divinities of the Philiſtines, commonly repreſented as a monſter, half man, and half fiſh; whence ſome have derived his name, the Hebrew word *dag* denoting a *fiſh*. According to Sanchoniathon the origin of this deity is very ancient, and he was the ſon of Cœlus, ſo called from the word *dagan*, which, in the Phœnician language, ſignifies *wheat*. As he was the inventor of the plough, and taught men the uſe of corn for bread, he was, after his death, ſurnamed Jupiter Agrotes, or the labourer; and being the inventor of agriculture, he was deified after his death. We have various conjectures concerning this divinity. According to ſome, he was Jupiter; according to others, Saturn. Others, again, repreſent him as Venus, or a female deity, alleging, that Venus was worſhipped under the form of a fiſh; and Diodorus Siculus relates, that, at Aſhulen, a famous city of the Philiſtines, Derceto, or Atergatis, (the ſame as Venus,) was worſhipped under the figure of a woman, whoſe extremities terminated in the tail of a fiſh. Some repreſented it as having the upper part of a human body, and as a fiſh from the waiſt downwards, while others gave it the form of a fiſh above, and a human figure from the thighs down; and others, again, made it altogether a fiſh. According to an ancient fable, Oannes, a kind of monſter, half man and half fiſh, roſe out of the Red ſea, and came to Babylon, and, having taught ſeveral arts, returned again into the ſea. Several of theſe animals are ſaid to have ariſen from this ſea in ſubſequent ages; one of which was called "Octagon," and hence, ſays Selden, was derived the appellation Dagon. Some have ſuppoſed that Dagon and Neptune were the ſame deity. Bochart conjectures, that Dagon was Japhet, the third ſon of Noah, and that he was made the god of the ſea, becauſe the lot aſſigned to him and his deſcendants included the iſlands, peninſulas, and countries beyond the ſea, or, according to Lactantius, the continent of Europe. Jurieu ſuggeſts, that Noah himſelf, who eſcaped from the deluge, was diſguiſed under the name of Dagon or Neptune. From the Scripture we learn, that when the Philiſtines had taken the ark of God from the Iſraelites, and brought it to the city of Aſhdod, or Azotus, or Azoth, as it was differently called, they placed it in the temple of Dagon, cloſe to the image of that deity; but when they afterwards entered the temple, they found the idol fallen on its face, with its head and hands broken off. The Philiſtines held this idol in great veneration; and erected in honour of it magnificent temples. His temple at Gaza muſt have been very large, ſince Sampſon, having pulled down the pillars that ſupported it, buried more than 3000 men in its ruins. This deity continued to have a temple at Aſhdod, during all the ages of idolatry, till the time of the Maccabees; for we read, that when the army, vanquiſhed by Jonathan, one of the Maccabees, fled to Azotus, and attempted to ſhelter themſelves in Beth-Dagon, or the temple of Dagon, Jonathan ſet fire to Azotus, and burned the temple, and all who fled into it. The head of Saul, as we learn from the book of Samuel, (1 Sam. ch. v.) was placed in one of the temples of this god, and his arms in that of Aſtaroth, whence we may infer that Dagon and Aſtaroth were diſtinct divinities. Banier's Mythology, vol. ii. p. 37. Milton's Par. Loſt, B. i.

DAGONVILLE, in *Geography*, a town of France, in the department of the Meuſe, and diſtrict of Commercy: 3 leagues E. of Bar-le-Duc.

DAGOTI, in *Biography*, ſee GAUTIER.

DAGOUA, in *Geography*, a town of Egypt on the

 Nile,

Nile, said to be a harbour for thieves and pirates; 12 miles N. of Cairo.

DAGOUNG, or SHOEDAGON, *temple of*, situated about $2\frac{1}{2}$ miles N. of Rangoon, the chief port of the Birman empire, is a grand building, more ornamented than that of Shoemadoe at Pegue, though not so high by 25 or 30 feet. The terrace on which it stands is a rocky eminence, considerably higher than the circumjacent country. It is ascended by above 100 stone steps, now decayed. The situation renders it a conspicuous object at the distance of many miles. The top and the whole of the spire are richly gilded, which, when the sun shines, exhibit a singularly splendid appearance. Shoedagon, the name of this temple, which signifies golden Dagon, naturally reminds us of the house of Dagon, mentioned in Scripture, and the image of idolatry which bowed down before the holy ark. See DAGON.

DAGSBOROUGH, a post-town of America, in the county of Suffex and state of Delaware, situated on the N. W. bank of Peper's creek, a branch of Indian river, and containing 40 houses: 19 miles from Broad-hill or Clowe's, and 127 S. from Philadelphia.

DAGUSSA, in *Ancient Geography*, a town of Asia, placed by Ptolemy in the country called Melitana.

DAGYSA, in *Zoology*, a genus of the Mollusca tribe, of which only a single species has hitherto been discovered, and which was taken by sir Joseph Banks and Dr. Solander in the Spanish sea, as related by Hawkesworth. These curious animals are three inches long and one in breadth, and adhere to each other by the sides. They have been described by some writers under the name of *Carcinum opalinum;* and by others are considered as appertaining to the Salpa genus. In the Gmelinian system the Dagysa genus is defined as having the body loose, nayant, angular, tabular, and open at each extremity; and the species which is named *notata*, as having the body marked at one end with a brown spot.

DAHÆ, in *Ancient Geography*, a people who inhabited the territory lying to the east of the Euxine sea and of the Palus-Mæotides, according to Strabo, who classes them among the Scythian Nomudes. They are mentioned by Virgil, and described as the "Indomitique Daæ." Servius (in loc.) says that they extended to the northern part of Persia.

DAHALAC, or DAHHLAK, in *Geography*, the largest island in the Red sea, near the coast of Abyssinia. Its whole length from N. W. to S. E. is 37 miles, and its greatest breadth 18. It is low and even, the soil of it is fixed gravel and white sand, mixed with shells and other marine productions. In summer it is destitute of all sorts of herbage, except a small quantity of bent grass, sufficient to feed the few antelopes and goats that are on the island: of the last animal there is a beautiful species, small, short haired, with thin black sharp horns, having rings upon them, and very swift-footed. This island is in many places covered with large plantations of acacia trees: although it is in the neighbourhood of Abyssinia, it does not partake of its seasons; no rains falls here from the end of March till the beginning of October; but in the intermediate months, especially December, January, and February, there are violent showers that last 12 hours, deluge the island, and fill the cisterns so as to serve for the ensuing summer; as the island has no hills or mountains, and consequently no springs. Of these cisterns for preserving water, there are 370, all hewn out of the solid rock. Tradition says that they are the works of the Persians; but Mr. Bruce suggests that they were more probably constructed by the first Ptolemies. After the fall of rains, the grass immediately springs up; which serves to feed the goats that supply the inhabitants with milk, the chief article of their subsistence in winter, for they neither plough nor sow. Their whole employment consists in working the vessels which trade to the different parts of the coast. The sustenance of the poorer sort is altogether shell and other fish. The women are very adventurous expert fishers. These miserable people, who live in the villages not frequented by barks from Arabia, subsist sometimes for a whole year without tasting bread: and yet such is their attachment to their native soil, that they prefer this barren and parched spot, destitute of almost all necessaries, especially such as are most essential, bread and water, to those pleasant and plentiful countries that lie on both sides of them. People of the better sort have a brown complexion, but those of the common sort, who are employed in fishing, are of a reddish hue, somewhat darker than the colour of new mahogany. Among them are also blacks, who come from Arkeeko and the Main; but these, upon marrying, become less black in the course of a generation. The inhabitants of Dahalac are a simple, timid, inoffensive people, who carry no kind of hostile weapon. The island is salubrious, and yet none of the inhabitants seem to attain an age of more than 60 years.

The southern cape of this island, called "Ras Shouke," which in Arabic signifies the Cape of Thorns, because it has upon it a number of acacia-trees, is in N. lat. 15° 27′ 30″; and the northern cape, or "Ras Antalou," is in N. lat. 15° 54′; 30″; the longitude of the island is 39° 20′ E. The harbour of Dobelew is of a circular form, and sufficiently defended from all winds, but its entrance is too narrow, and within it is full of rocks, consisting of ramifications of white coral intermixed with large black stones. Three miles S. W. of the harbour is the village, called Dobelew, consisting of about 80 houses, built of calcinable stone, drawn from the sea, and covered with bent grass. The south-west extremity of the village is in N. lat. 15° 42′ 22″. Irwee, a smaller village, lies at the distance of about four miles from Dobelew, and is situated in the centre of the island. In Dahalac there are 12 villages or towns, little different in size from Dobelew; each has a plantation of doom-trees round it, which furnish the only manufacture in the island; the leaves of this tree, when dried, are of a glossy white, which may be easily mistaken for sattin; and of these are made baskets, that are very neat and beautiful, and so well wrought, that they will contain water for 24 hours without leaking.

Dahalac depends upon Masuah, and is conferred by a firman from the grand signior, on the basha of Jidda, and from him on Metical Aga, then on the Naybe, and his servants. The revenue of the governor consists of a goat brought to him monthly by each of the 12 villages. Every vessel, that puts in there from Masuah, pays him also a pound of coffee; and every one from Arabia, a dollar or pataka. No sort of small money is current at Dalahac, except Venetian glass-beads, old and new, of all sizes and colours, broken and whole.

Notwithstanding the present miserable state of this island, the pearl-fishery was very flourishing here under the Ptolemies; and long after, in the time of the caliphs, it produced a great revenue, and till the sovereigns of Cairo began to withdraw themselves from the dependency on the Porte, Dahalac was the principal island that furnished the pearl fishers, or divers. It was, indeed, the chief port for the fishery on the southern part of the Red sea, as Suakem was on the north; and the basha of Masuah passed part of every summer here, to avoid the heat at his place of residence on the continent. The fishery extended from Dahalac and its islands

iſlands nearly to lat. 20°. The inhabited iſlands furniſhed each a bark, and ſo many divers, and they were paid in wheat, flour, &c.; ſo that a few months employment furniſhed them with every thing neceſſary for the reſt of the year. The fiſhery was rented, in later times, to the baſha of Suakem. The pearls found here were of the largeſt ſize, and inferior to none in water or roundneſs. Tradition ſays, that this was excluſively the property of the Pharaohs, or the old kings of Egypt before Mahomet. In the ſame extent between Dahalac and Suakem, there was another very valuable fiſhery, that of tortoiſes, from which the fineſt ſhells of that kind were produced; and a great trade was carried on with the Eaſt Indies, (China eſpecially) at little expence, and with great profit. The animal itſelf was very plentiful between lat. 18° and 20°. In proceſs of time Dahalac became dependent on the baſha of Jidda, and he appointed an aga, or ſubaltern governor, who paid him a moderate ſum, and appropriated to himſelf the greater part of the proviſions and ſalary allowed for the pearl fiſhery. When the princes of Arabia became again free from the Turkiſh power, Dahalac, Maſuah, and Suakem, returned to their ancient maſters, to whom they are now ſubject, governed, indeed, by ſcheiks of their own country, and preſerving only the name of Turkiſh government, each being under the command of a robber and aſſaſſin.

The immenſe treaſures at the bottom of the Red ſea have been abandoned for near 200 years, though they were probably never richer than they are at preſent. A ſettlement upon the river Frat, in N. lat. 21° 28′, which has never yet belonged to any but wandering Arabs, might open to the Eaſt India company a market both for fine and coarſe goods from the ſouthern frontiers of Morocco to Congo and Angola, and ſet the commerce of pearls and tortoiſe-ſhell again on foot. The whole portion of the gulf from Suez, ſays Mr. Bruce, is in their charter; and 20 ſhips might be employed on the Red ſea, without any violation of territorial claims. At Dahalac they have neither horſes, dogs, ſheep, cows, nor any ſort of quadruped, except goats, aſſes, a few half-ſtarved camels, and antelopes, which laſt are very numerous. The inhabitants have no knowledge of fire-arms; and there are no dogs nor beaſts of prey in the iſland to kill them; ſome few, indeed, are caught in traps.

The language at Dahalac is that of the "Shepherds;" Arabic too is ſpoken by moſt of the inhabitants. From this iſland are ſeen the mountains of "Habeſh," running in an even ridge like a wall, parallel to the coaſt, and down to Suakem. Bruce's Travels, vol. i. B. i.

DAHHMAK, a town of Arabia, in the country of Yemen; 16 miles S.S.E. of Abu-Ariſch.

DAHL, Michael, in *Biography*, a painter, native of Stockholm, who at an early age came into England, being introduced into this country by an Engliſh merchant. Dahl afterwards travelled to Paris, and reſided there ſome time. He then viſited Italy, where he painted, amongſt others, the portrait of queen Chriſtina of Sweden. In 1688 we find Dahl returned to England, where he acquired ſome reputation as a portrait painter. He died in London in 1743 at the advanced age of 87 years. The following portraits are a few of thoſe engraved after this artiſt: Joſeph Addiſon, 1719, by Simon; queen Anne, by W. Faithorne; prince George of Denmark, by J. Simon; the duke of Marlborough, by ditto; the duke of Ormond, by ditto. Walpole.

Dahl, or Dal, in *Geography*. See Dal Elbe.

DAHLBERG, Eric, in *Biography*, a celebrated Swediſh general, whoſe talents and virtues led him to the higheſt diſtinctions in his country, was born in October, 1625. His education was very limited, but by dint of application, and with ſcarcely any aſſiſtance, he made a rapid progreſs in mathematics, a ſcience always of the laſt importance to thoſe who are deſtined for high military command. The elements of geometry he took great pains to apply to the art of fortification, and to his ſucceſs in this he was indebted for the rank to which he afterwards attained. In 1648 he was appointed engineer under Guſtavus Adolphus, and in 1656 he joined the army in Poland, and was appointed lieutenant-general-quarter-maſter of the main diviſion. During the moſt remarkable events of the war in Poland, he was the attendant, and probably chief adviſer of his ſovereign. In the following year, when the king found it neceſſary to tranſport his army to Denmark, Dahlberg was ſent to ſurvey the Great Belt, then frozen over, and in conſequence of his opinion his majeſty reſolved to march his army acroſs the ice, by which he ſpeedily made himſelf maſter of the whole country, to the very walls of Copenhagen. From this time he was employed in the moſt important offices, both as a military commander, and alſo in political miſſions. So much did he improve the ſtate, and augment the ſtrength of his country, that he has with great juſtice been ſtyled the Swediſh Vauban. In 1696 he was appointed governor of Livonia, which he defended when invaded by the Saxons in 1700. He died at Stockholm in 1703, in the ſeventy-eighth year of his age. He left behind him a work of great merit entitled "Suecia Antiqua Hodierna," in three vols. folio. This work conſiſts of plates only, and the drawings from which they were executed were almoſt all taken on the ſpot by Dahlberg himſelf. Gen. Biog.

DAHLEN, in *Geography*, a ſmall town of Saxony, in the circle of Meiſſen or Miſnia, with 916 inhabitants, belonging to the counts of Bunau, and remarkable for extenſive plantations of mulberry trees and large crops of the beſt madder.

DAHLIA, in *Botany*, (named by the late prof. Cavanilles in honour of Andrew Dahl, a Swediſh botaniſt, author of a little volume of botanical obſervations.) Cavan Ic. Plant. v. 1. 56. t. 80. (Georgina. Willd. Sp. Pl. v. 3. 2124.) Claſs and order, *ſyngeneſia polygamia-ſuperflua*. Nat. Ord. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Cal.* double; the outer of ſeveral leaves, ſix or ſeven, ovato-ſpatulate, reflexed; inner of one leaf cup-ſhaped, in ſeveral ovate ſegments. *Cor.* compound, radiant; florets of the centre perfect, with a tubular, ſtalked, five-cleft petal; thoſe of the radius fertile, with an ovate three-toothed petal, equal in number to the ſegments of the calyx. *Stam.* (in the perfect florets,) filaments five, broadeſt at the baſe, inſerted into the bottom of the petal; anthers united into a tube. *Piſt.* Germen ſomewhat ſpatulate, obſcurely triangular, notched at the top; ſtyle thread-ſhaped; ſtigmas ſomewhat ſpreading, pubeſcent. *Seeds* ſolitary, ſhaped like the germen. *Recept.* flat, chaffy; the ſcales large, the middle ones keeled, the reſt flat. *Down* none.

Eſſ. Ch. Calyx double; the outer of many leaves. Corolla radiant, its rays equal in number to the ſegments of the calyx; ovate, three-toothed. Receptacle chaffy. Stigmas downy. Seed-down none.

This genus comes very near Polymnia, and Dr. Sims has obſerved in one ſpecies, D. *coccinea*, Curt. Mag. t. 762, that the florets in the centre of the diſk are barren, thoſe in its circumference fertile, the radius being neuter or abortive, ſo that the genus, if all its ſpecies agreed in this reſpect, ſhould be referred, like Polymnia, to the order *Polygamia-neceſſaria*.

The

The fpecies of Dahlia are feveral, all natives of mountainous parts of the Spanifh fettlements in South America. Their flowers are large and handfome, like thofe of a funflower, but the rays moftly red or purple like the China-after, and likewife variable in this refpect. The herbage is coarfe and rank, with compound leaves. The moft complete hiftory of the genus is juft given in the fecond part of the Tranfactions of the Horticultural Society by Mr. Salifbury, who recommends the cultivation of fome fpecies in poor gravelly foil, in the open ground, by which means they grow lefs luxuriantly, and flower earlier and more copioufly.

DAHME, in *Geography*, a fmall town of Saxony, in the principality of Querfurt, with 1964 inhabitants, and remarkable for its manufactures of linen and woollen cloth and worfted ftockings. It has a royal palace, an infirmary, and an orphan-houfe. Its diftrict contains 14 villages, and counts a population of 4162 individuals.

DAHMEC, a town of Afia, in the country of Candahar; 28 miles S.W. of Candahar.

DAHN, a fmall town of France, in the department of the Lower Rhine, chief place of a canton, in the diftrict of Weiffembourg. The place contains 608, and the canton 4892 inhabitants, difperfed in fifteen communes on a territorial extent of 225 kiliometres. Dahn is 9 miles N.W. of Weiffembourg.

DAHOMAY, Dauma, or, as it is fometimes called, Fouin, an inland kingdom of Africa, fituated N. of the Slave Coaft, about 60 or 70 miles from the Atlantic, and extending 150 or 200 miles into the unknown interior of the country. It is faid to be bounded by Gaoga and Tombucto on the weft, Bita on the north, Biafara on the eaft, and the mountains of Guinea on the fouth. It lies behind the maritime coaft of Whidah, and is faid by Norris, in his "Memoirs of the reign of Boffa Ahadee, king of Dahomy, &c." publifhed in 1717, to have received its name from Tacoodonou, a chief of the Foy nation, early in the 17th century, who reduced Da, king of Ahomay, ripped open the belly of Da, and placed the body under the foundation of a palace, which he built in his newly acquired territory, as a memorial of his conqueft. This he called Dahomy, from *Da*, the name of this unfortunate victim, and *homy*, belly; that is, a houfe built in Da's belly. Of this country very little was known, prior to the reign of Guadja Trudo, who fucceeded Wacbaigah in 1708. Trudo was diftinguifhed by courage, generofity, and magnanimity; and his memory continued to be held in fuch veneration by the Dahomans, that they even fwore by his name as the moft folemn of all affeverations; but, notwithftanding his fplendid qualities, he appears to have entailed, by his ambition, lafting miferies on his country. He was fucceeded in 1732 by his fon Boffa Ahadee, who was raifed to the throne by the two prime minifters, to whom belongs the right of chufing the future monarch, in preference to his brother Zingah. Zingah, preparing to affert his right, was feized, and it being unlawful to fhed royal blood, he was fewed up in a hammock, and thrown into the fea. One of the firft edicts of the new king was, that every man of the name of Boffa throughout his dominions fhould be put to death, as he thought it an infult to majefty, that any of his fubjects fhould bear his name. Another inftance will be fufficient to mark the character of this negro prince. When his father reduced the Whidahs, the greater part of the conquered nation deferted their country, and fettled in a neighbouring fwamp, where they frequently haraffed the Dahomans. Thefe refugees continued under a king; and on a difpute between two brothers for the fupreme power, Boffa Ahadee, to improve this divifion, patronifed the younger, who engaged to become his tributary; and as a teft of his fidelity, Boffa required him, on the murder of his brother, to devour his heart; it is added, that this unnatural condition was fulfilled! During the long reign of this cruel and ferocious tyrant, Boffa Ahadee, the country was haraffed and wafted by wars, foreign and domeftic, in which multitudes were flain; but nothing fills the mind with fo much horror as the facrifices of human victims for the purpofe of watering (according to the country expreffion) the graves of the deceafed royal family. Without fuppofing that the Dahoman monarchs can receive fome pleafure from the contemplation of the monuments of their vengeance and wanton cruelty, it is difficult to account for their paffion for decorating the walls of their houfes and their apartments with the fkulls and bones of the unhappy wretches who have perifhed by their hands. In the reign of Adahoonzou, the fucceffor of Boffa Ahadee, after the flaughter of the prifoners whom he had taken in war, their fkulls were ordered to be applied to the decoration of the royal walls. On one occafion, a calculation having been made that 127 fkulls were wanted for the completion of this extraordinary embellifhment, the prifons were thrown open, and the requifite number of devoted victims dragged forth from among the wretched captives, to be flaughtered in cold blood, for this hellifh purpofe. Previoufly to their execution, they were informed that the heads brought home by the Agaow had not been found fufficient to garnifh the palace, and that theirs were required to fupply the deficiency. This act of barbarity was applauded by all prefent.

The capital of this kingdom, Abomey, lies in about N. lat. 9° 50'., and between 3° and 4° E. long. The country is fertile and luxuriant; the foil is a deep rich clay of a reddifh colour, with a little fand on the furface, except about Calmina, where it is more light and gravelly; but through the whole country, as far as it has been examined by Europeans, there is not found a ftone as big as an egg. The country yields a plentiful fupply of farinaceous vegetables, fuch as maize, millet, kidney beans, called callavances, and a fpecies of beans called ground beans. The Dahomans likewife cultivate yams, potatoes, the caffada or manioc, the plantain, and the banana. Pine-apples, melons, oranges, limes, guavas, and other tropical fruits, are alfo abundant. Nor is it deftitute of productions adapted for commerce and manufacture; fuch as indigo, cotton, the fugar-cane, tobacco, palm-oil, together with a variety of fpices, particularly a fpecies of pepper, fimilar in flavour to the black pepper of the Eaft Indies, and fcarcely diftinguifhable from it. The Dahomans, like the other inhabitants of tropical climates, plant twice a-year, *viz.* at the vernal and autumnal equinoxes, after which the periodical rains fall. The language of the country, called by the Portuguefe "lingua geral," or general tongue, is fpoken not only in Dahomy proper, but in Whydah, and the other dependent ftates; and likewife in Mahee and feveral neighbouring places. With refpect to the Dahoman religion, it confifts of a jumble of fuperftitious ceremonies, of which it is not poffible to convey to the reader any intelligible and fatisfactory account. The Portuguefe word "feitiço," or as the Englifh pronounce it "fetifh," fignifying witchcraft, has been adopted by moft of the maritime nations of Africa, as well as by the Europeans who trade thither. The term is now comprehenfive in its fignification, and includes either the feveral objects of worfhip, ideal or corporeal, the act of worfhip itfelf, or the various amulets, charms, and fuperftitious mummery of the priefts, or fetifhmen, who abound in this country. They obferve no fabbath, unlefs their market days, which are confidered as days of recreation, may be fo called. Moft of the favage nations have fome confufed ideas of a fupreme intellectual Being, the maker of the univerfe; but thefe ideas not being eafily

underſtood among a people unaccuſtomed to metaphyſical reaſoning, a variety of material and corporeal beings have been ſelected as objects of devotion, ſuch as the ſun, moon, living animals, trees, and other ſubſtances. The tiger is the fetiſh of Dahomy; the ſnake, that of Whydah. Among the amulets or charms, the principal is a ſcrap of parchment, containing a ſentence of the Koran, which the natives purchaſe from the moors who viſit this country. This they hang up in their apartments, which are likewiſe decorated with rude miſhapen images, tinged with blood, beſmeared with palm-oil, ſtuck with feathers, bedaubed with eggs, and other abſurd applications, of which a particular account would be both tedious and unprofitable.

As to the nature of the Dahoman government, it is the moſt perfect deſpotiſm that exiſts, perhaps, on the face of the earth; nevertheleſs, at particular times, the moſt licentious anarchy prevails; for, on the death of the king, till the appointment of his ſucceſſor, the government is diſſolved; and a horrid ſcene commences in the palace immediately on the king's deceaſe. His wives begin with demoliſhing the furniture of the houſe, the gold and ſilver ornaments and utenſils, the coral, and, in ſhort, every thing valuable that belonged either to themſelves or to the late king, and then murder one another. The policy of the country admits of no intermediate degree of ſubordination between king and ſlave; at leaſt in the royal preſence, when the prime miniſter is obliged to proſtrate himſelf with as much abject ſubmiſſion as the meaneſt ſubject: all acknowledging the right of the ſovereign to diſpoſe of their perſons and property at pleaſure. Beyond the precincts of the palace, indeed, the miniſters enjoy very eminent privileges, and are diſtinguiſhed by a variety of inſignia, and by the ſervile homage of their inferiors. One of the miniſters, peculiarly dreſſed and equipped, is always found in waiting at the king's gate; but is never allowed to enter till the monarch ſignifies his permiſſion by one of the women. On his entrance, he crawls into the royal preſence on his hands and knees, rubbing his head in the duſt, and uttering the moſt humiliating expreſſions. No perſon is permitted to ſit, even on the floor, in the king's preſence, except the women; and they muſt kiſs the earth, when they receive or deliver the king's meſſage. The king, and all his ſubjects, receive ſtrangers with the moſt remarkable courteſy; and every one ſalutes the ſovereign according to the faſhion of his own country, without being under the previous neceſſity of learning the court etiquette. White viſitors are always honoured with a glaſs of ſome cordial liquor, filled by the king himſelf; and the refuſal of it gives offence. When a ſubject receives a favour of this kind, he lies on his back, while the king holds the bottle to his mouth, and he is obliged to drink till the royal hand be withdrawn. The doctrine of paſſive obedience and non-reſiſtance is univerſal among the Dahomans, and the moſt oppreſſive mandates of the monarch are ſubmitted to without a murmur.

The king of Dahomy maintains a conſiderable ſtanding army, commanded by an agaow, or general, with ſeveral other ſubordinate military officers. The payment of theſe troops chiefly depends on the ſucceſs of the expeditions in which they are engaged, at the king's peremptory and irreſiſtable orders. On extraordinary occaſions, all the males, able to bear arms, are obliged to repair to the general's ſtandard; every "Caboceer" (formed from the Portugueſe, *cabecciro*, a head-man) marching at the head of his own people. The king himſelf ſometimes takes the field at the head of his troops; and, on peculiar emergencies, at the head of his women. For, within the different royal palaces in Dahomy, 3000 women, at leaſt, are immured: of theſe ſeveral hundreds are trained to the uſe of arms, under a female general and ſubordinate officers; and they go through their evolutions with as much expertneſs as the male ſoldiers. They have their large umbrellas, their flags, their drums, trumpets, flutes, and other muſical inſtruments. The flute, though ſimple, open at both extremities, and having a ſmall notch at the mouth-end, is capable of producing very agreeable notes; and the king's women underſtand and practiſe the combination of the perfect concords, thirds, and fifths, and their little airs are not inelegant.

The chief part of the public revenue conſiſts of voluntary gifts, paid by the ſubjects at the time of the annual ceremonies, called the "Cuſtoms," when the Caboceers and traders attend, bringing their contributions, according to their reſpective circumſtances. Beſides theſe, a duty is levied on commerce, and ſomething ariſes from captives taken in war, all of whom that are carried to market being ſold on the king's account; but, as he pays a certain ſum to his troops for every priſoner, and as moſt of the captives are put to death, few are reſerved for ſale. The currency of this country conſiſts of the well-known ſhells called cowries, 1000 of which are reckoned equal to half a crown. All diſburſements from the king's houſe are made in bunches of ſtrung cowries, containing 2000 each, deducting $\frac{1}{40}$th part as a perquiſite to the king's women for piercing and ſtringing them. Of theſe diſburſements, a conſiderable part conſiſts of an annual tribute paid to a formidable neighbour, the king of Eyeo, ſituated north-eaſt from Dahomy. The king of Dahomy has ſeveral palaces, each occupying a piece of ground nearly a mile ſquare; that at Calmina, called "Simbamy," or a great houſe, is encompaſſed with a very ſubſtantial clay wall, of a quadrangular form, and about 20 feet high. In the middle of each ſide is a guard-houſe, with two centinels at the gate, and a guard of armed women and eunuchs within. On the thatched roofs of theſe guard-houſes, are ranged, on ſmall wooden ſtatues, many human ſkulls. Within are ſeveral large courts, ſurrounded by clay walls, and having in each of them a ſort of piazza or ſhed, formed of poſts about 7 feet high, at the diſtance of 12 or 14 feet from the wall; the intermediate ſpace is covered with a ſlanting thatched roof, ſupported by bamboo rafters. In the middle of the palace is a large building, of two ſtories, and about 30 or 40 feet high, ſo that the top of it is viſible from without. The receſſes of the palace are ſcarcely ever entered by men; and the female apartments are guarded from intruſion, with more than eaſtern jealouſy. The vulgar among the Dahomans affect to believe that their king does not eat; and, indeed, he does not eat in public, though he makes no ſcruple to drink. However, he entertains the whites with great hoſpitality, and with diſhes prepared by European cooks. The table-cloth, on ſuch occaſions, is a new piece of linen, cut off for the purpoſe; the diſhes are of pewter or earthen ware; and the knives and forks are ſilver-handled. The white men are ſeated on chairs; but the caboceers, and heir-apparent, are placed on the ground near the Europeans, who hand them ſome of the victuals; which they eat, as if by ſtealth, without knife or fork.

The dreſs of the men in Dahomy conſiſts of a pair of ſtriped or white cotton drawers, of the manufacture of the country, over which they wear a large ſquare cloth of the ſame, or of European manufacture. A piece of ſilk or velvet, 16 or 18 yards, forms cloth for a caboceer. The head is uſually covered with a beaver or felt hat; and the king, and alſo ſome of his miniſters often wear a gold or ſilver laced hat, with a feather; the arms and upper part of the body are generally naked; and the feet are always bare, none but the ſovereign

fovereign being permitted to wear fandals. In the hand is ufually carried either a cutlafs or wooden club; that of an officer of ftate is ivory. Inferior caboceers carry a fort of blunt fabre, with a broad blade and wooden handle; warriors wear what is called a grafs cloth, made in the country of the fkin of palm-tree leaves, parted into fmall threads, knotted and wove, and tinged with various dirty dyes, which is wrapped round the loins. They alfo wear a cartouch-box of their own manufacture, a powder-flafk of calibafh, with many grotefque ornaments and fetifhes, which, together with the uncouth devices painted on their faces and bodies, give them a very fiend-like appearance. Every Dahoman man carries alfo a tobacco pouch, containing tobacco, a flint, fteel, and tinder; together with one or two tobacco pipes, in a neat wooden cafe. The drefs of the women confifts of a greater number of articles than that of the men. Their ornaments are beads and cowries, and rings of filver or bafer metal. Their ears are pierced, fo as to admit a coral bead of the fize of the little finger, or a portion of red fealing-wax, or a piece of polifhed oyfter-fhell. Girls, before the age of puberty, wear nothing but a ftring of beads or fhells round the loins, and young women ufually expofe the breafts to view. The Dahomans are lefs addicted to the practice of *tattowing* the body than their neighbours; contenting themfelves with a perpendicular incifion, which leaves a mark between the eye-brows.

Circumcifion is univerfally practifed in Dahomay, but not at fo early an age as among the Jews; and it is fo indifpenfible that the females do not admit the careffes of the uncircumcifed. A certain operation, peculiar to this country, is likewife performed upon the women: "prolongatio artificialis labiorum pudendi, capellæ mamillis fimillima." The Dahoman women do not admit the embraces of their hufbands during pregnancy, nor at the time of fuckling, which continues two or three years, nor at the time of the catamenia; during which they retire to a part of the town allotted for their reception. The proftitutes, licenfed by royal authority, are obliged to confine themfelves to a particular diftrict, and are fubject to an annual tax.

The general character of the Dahomans is marked by a mixture of ferocity and politenefs. They are brave, hofpitable, generous; and, where the tranfactions of their government allow, affable and communicative.

The annual ceremony, called "Cuftoms," is ufually celebrated foon after Chriftmas, on which occafion the king leaves Calmina, where he generally refides, and repairs to Abomey, his ancient capital, and the burial-place of his family. He then invites, by fpecial meffengers, called "half-heads," becaufe half of their heads is fhaved, the European governors at Grigwee, to witnefs the folemnization of this feftival. Each governor brings his annual prefent, confifting of various articles, in value amounting to about 50*l.* fterling.

For this prefent the king returns more than an equivalent; fuch as a young female flave, and one fine cotton cloth, entertaining his guefts during their ftay, with great liberality and kindnefs. On their journey thither they are accommodated at caravanferas, provided for their convenience, and on their arrival at Abomey, they are received with a falute of cannon, and lodged in fuitable apartments. The celebration of the "Cuftoms" ufually continues about a month, during which there is fome public exhibition every fourth, or market day, the intermediate days being employed in preparations. One of the market days is fet apart for finging and dancing; the fongs are extemporary, in praife of the monarch and his exploits, and the performers are rewarded according to the merit of their compofitions. The bards alfo rehearfe the whole hiftory of their country, which continues feveral days, during which they fit at the king's gate. Another day is allotted for feafting in the market-place, where tents are pitched for the accommodation of the king, caboceers, white vifitors, and embaffadors from foreign ftates. Various other fcenes are exhibited during this carnival, which clofes with a fingular exhibition, on a ftage erected and prepared for the purpofe, of cowries ftrung in bunches of 2000 each, pieces of brocade and other filks, ftrings of coral, European and country cloths, Brazil tobacco, pipes, bottled liquors, and a variety of other articles. At an appointed time the king, with his caboceers and vaffals, repair to the ftage; and each perfon prefent felects a cloth according to his rank; and fometimes a ftring of coral is prefented to each. The king, then, throws a bunch of cowries over the fence that guards the ftage among the multitude; the caboceers, and Europeans, following his example, tofs over all the goods, except a few bunches of cowries, which are referved for fome of the favourite fervants. The rabble, prepared for this fport, contend for the feveral prizes. But, as an effufion of blood commonly forms a part of a Dahoman exhibition, this fcene is clofed with the death of at leaft one victim, who, together with feveral other animals, is thrown, bound, from the ftage, to be murdered below.

The Dahomans difplay great ingenuity, confidering the rude fimplicity of their tools, in their fpecimens of art. Although their looms are very aukward machines, yet they manufacture cloths of cotton, held in high eftimation among themfelves, and often purchafed by the Europeans for counterpanes, at a high price. They likewife weave cloths of the palm-tree leaves, which they fometimes dye, but more frequently wear in the natural colour, which is fomewhat higher than that of nankeen. They likewife make neat mats of the fame fubftance. The forges ufed by their fmiths are of a very fimple conftruction; and yet they contrive to fabricate not only the neceffary inftruments of hufbandry, but carpenters' tools, cutlaffes, fpears, and other weapons. They have alfo braziers or filver-fmiths, who make bracelets, handles for cutlaffes, rings for the fingers, and other trinkets of brafs or filver, which they melt in crucibles of their own manufacture. They make likewife earthen pots, water jars, and other utenfils, of the fame materials. The cookery of the Dahomans comprehends but a few difhes; thefe, however, are excellent; of which black foup is the chief. This is made either of flefh or fifh, with a variety of mucilaginous vegetables, well feafoned with pepper and falt, and enriched with palm-oil. An exquifite flavour is given to this difh by an ingredient made of the feeds of a tree, called in the country wild tamarind, fomewhat refembling thofe of the cucumber. Their bread is made of maize or millet, fometimes boiled into a ftiff pudding, and fometimes baked, either with or without leaven. They make alfo a very light white and delicate fermented bread of calavanfes, firft ftripped of the hufks, and a kind of pafte or flummery of fermented Indian corn, not unlike blanc-mange, though not fo adhefive. The Dahomans are at all times very cleanly in their perfons, and particularly fo with refpect to their food, and the utenfils ufed in the kitchen and at table. A very good foup is manufactured in the country of palm-oil and pot-afh.

From a remarkable fpeech of Adahooneou to Mr. Abfon, when he was informed of what had paffed in England on the fubject of the flave-trade, we are led to infer that the Dahomans never go to war for the purpofe of fupplying European fhips with flaves, and that they never fell their wives and children for the fake of procuring a few kegs of brandy. We cannot,

not, however, forbear lamenting the mifery of thofe people, by whom a tranfportation into a diftant country, accompanied with flavery, is confidered as a fituation to be envied. See "The Hiftory of Dahomy, an inland kingdom of Africa;" compiled from authentic Memoirs, with an Introduction and Notes. By Archibald Dalzel, formerly governor at Whydah, and now at Cape Coaft Caftle, 4to.

DAHRA, a fmall ifland in the Red fea, near the coaft of Arabia; one league S.W. of Loheia.

DAHRIJE, a town of Egypt, fituated on the Nile; 13 miles S S.W. of Damietta.

DAIBOTH, in *Mythology*, an idol of the Japanefe, in honour of whom they have erected many temples, to which numerous devotees and worfhippers refort. The accefs to the chief temple of this deity lies through a kind of gateway, on either fide of which are two monftrous figures with feveral arms, holding arrows, fwords, and other offenfive weapons. The idol is feated in the centre of the pagoda, on a table-altar, elevated above the ground. His height is fuch, that he touches the roof of the temple with his hand; and his bulk is fo enormous, that his hands are more extended than the body of an ordinary man. This idol has the breafts and face of a woman, and black locks, which are crifped and woolly, like thofe of a negro. He is encompaffed on all fides with gilded rays, on which are placed many images, reprefenting the inferior idols of the Japanefe. Others are placed on pedeftals, and crowned with a nimbus or glory. The altar on which he refts is furnifhed with a profufion of lighted lamps. The temple is fupported by wooden pillars, confifting of trees in their natural and unformed ftate, fo as to give the building a romantic appearance. The frame-work is painted red, and near it is a chapel, externally varnifhed, in which the facrifices are prepared, and where the people worfhip, except on the greater feftivals.

DAIGREMONT, M. in *Biography*, a French engraver, who flourifhed towards the end of the 17th century. He was the difciple of Pierre le Pautre, and affifted J. Berrain in the Books of Ornaments, publifhed in Paris. Befides thefe, we have by his hand fome prints of architecture, and a fet of Views of Verfailles. At length he quitted the graver to engage in commercial purfuits. Heinecken.

DAIKOKU, in *Mythology*, a Japanefe deity, whom the people regard as the fource of all their riches. This idol is feated on a fack of rice, the oriental fymbol of plenty, and holding in his hand a hammer, by every ftroke of which he confers every kind of domeftic convenience, gay habits, and great riches.

DAILE, in a fhip, the trough wherein the water runs over the decks.

DAILLE', John, in *Biography*, a French proteftant minifter of confiderable celebrity, was born in the year 1594. He was defigned by his father for bufinefs, but his inclination being decidedly for books, he was inducted into the learned languages and philofophy by the moft celebrated profeffors of the age and country in which he lived. In 1612 he undertook the education of the grandfons of M. du Pleffis-Mornay. This he efteemed a moft fortunate occurrence, as giving him the friendfhip and affiftance of the grandfather, who frequently read with him books of the higheft intereft, and imparted to him thofe rich ftores of learning and knowledge with which his own mind was imbued. Seven years did M. Daillé refide in the family of this excellent and venerable man, when he fet out with his pupils on their travels. In Italy one of the young men died, and it was with difficulty that the tutor, by the aid of the excellent father Paul, was enabled to tranfmit the body to France, to be interred with his anceftors. From Italy he accompanied his furviving pupil to Switzerland, Germany, Flanders, Holland, and England, and returned to his native country in the year 1621. Shortly after, he engaged in the minifterial functions, under the patronage of M. du Pleffis-Mornay, who in a very fhort time died in the arms of M. Daillé. He now engaged in revifing and preparing memoirs of his friend, which had been collected by De Ligues, and which were afterwards publifhed in two volumes. He was in 1625 elected minifter of the church at Saumur, where he had fcarcely been a year when he was called by the confiftory of Paris to take charge of the church at Charenton. Here he fpent the remainder of his life, and was regarded as one of the moft excellent as well as judicious defenders of the Proteftant caufe. He died in the year 1670, at Paris, much efteemed by the Catholics, as well as by the Proteftants, for his learning, abilities, integrity, moderation, and his polite and obliging manners. By his works he was diftinguifhed among contemporary writers, as well for his candour, as for the ftrength of his arguments, and the clearnefs of his ftyle. The principal works publifhed by M. Daillé, and which we fhall notice, are, 1. "De l'Ufage des Peres," or "Concerning the right Ufe of the Fathers," which is characterized as "a very ftrong chain of arguments that form a moral demonftration againft thofe who would have differences in religion to be decided by the authority of the fathers." 2. "An Apology for the reformed Churches," &c. in which he vindicated them from the charge of fchifm brought againft them by the advocates of the Romifh church; and, 3. "An Apology for the Synods of Alençon and Charenton." The firft two were tranflated into the Englifh and Latin languages, and enjoyed a very high reputation; the laft gave rife to a bitter controverfy, which injured the fame of all the parties engaged in it. Bayle. Moreri.

DAINUR, in *Geography*, a town of Perfia, in the province of Irak-Agemi; 50 miles W. of Amadan.

DAJON, a town of Africa, in the country of Agonna.

DAIRA, in *Mythology*, one of the Oceanides, mother of Eleufis, by Mercury.

DAIRI, or Dairo, in the *Hiftory of Japan*, is the fovereign pontiff of the Japanefe; or, according to Kæmpfer, the hereditary ecclefiaftical monarch of Japan. In effect, the empire of Japan is at prefent under two fovereigns, *viz.* an ecclefiaftical one, called the *dairo*, and a fecular one, who bears the title of *kubo*. The laft is the emperor, and the former the oracle of the religion of the country. See Japan.

DAIRIER, in *Rural Economy*, a name fometimes applied to the perfon who keeps a dairy, or a dairy-man.

DAIR-KARRAN, in *Geography*, a town of Afiatic Turkey, in the province of Kurdiftan; 30 miles S.S.E. of Kerkuk.

DAIRY, in *Rural Economy*, a name fometimes applied to the different forts of products of this kind, and fometimes to the place where milk, butter, and cheefe, are laid up and preferved; hence thefe repofitories are further diftinguifhed into butter, cheefe, and milk dairies, according as one or other of thefe articles conftitutes the principal object of the dairy-farmer. It has been remarked by a late partial writer, that there are fome forts of grafs lands that anfwer better in this management than others. It is not, he fays, well decided, though general experience feems to favour the opinion, that the very fertile pafture lands may be more profitably applied to the purpofe of grazing or fattening animals, than that of the dairy; but fuch as are not capable of bring-

ing the larger forts of cattle to a complete ftate of fatnefs, and which ufually let from twenty to five-and-twenty fhillings the acre, may be more profitably employed in this way. And that moft of the low and more moift kinds of meadow lands, which, though the value may be high, as they do not fucceed fo well for the purpofe of fattening, may be found highly ufeful under the dairy fyftem. The high, open, and expofed uplands are always, he conceives, lefs proper for this fort of practice, than thofe which are fituated lower, and which are more enclofed and warm. It is added, that in this bufinefs the nature of the paftures and other forts of food which the farmer has at command, muft chiefly direct him in the extent and kind of dairy which he is to purfue. Where the grafs lands are of the older kinds, and tolerably rich and fertile, butter fhould probably, in general, he thinks, be the principal object; but where they have been more recently converted to the ftate of fward, and are of a more cool as well as lefs rich quality, cheefe may be the moft depended upon. It is, perhaps, fays he, only under particular circumftances and fituations that the different methods or modes of dairying can be profitably and conveniently combined or carried on together. Some fituations, however, admit of it with very confiderable advantage.

It is an obfervation, fanctioned by long experience in this fort of management, in the midland diftricts, that grounds which have been for a great length of time in the ftate of pafture, are capable of affording milk which abound more in the oily principle, or that of cream, while thofe which have been laid down to fward for a fhorter period, and are of a more moift, cold quality, are more productive in fuch milk as has the cafeous or curdy material in a large proportion in comparifon to that of the cream. And which the practice of the Yorkfhire dairy-farmers ftill further confirm, by being much in the habit of preferving their old paftures in their original ftate, in confequence of their finding that the milk which is produced from them is churned with much greater facility, and the butter capable of being kept in a better manner, than where fuch naturally rich grounds are improved by tillage. It has been ftated that much difficulty has been found, not only in the making, but the keeping of the butter, efpecially in the warmer months, in thofe cafes where the land had been broken up by tillage, and rendered more rich, by the application of manure, efpecially that of the calcareous defcription, where, while in the natural ftate, there were not the fmalleft difficulties of this nature, the butter being of the fineft quality. From which a conclufion is drawn, that old paftures have in addition to the property of the oily or bituminous matter being fupplied in larger proportion, that of rendering the butter more firm and waxy in its quality. It has likewife been noticed by an able writer, that in the highlands of Scotland the richnefs of the butter has been univerfally afcribed to the cows feeding upon the old grafs in the remote glens; though it is hinted that this may partially depend on the manner in which it is made. In Chefhire the inferior forts of pafture lands are likewife ftated by the author of the "Six Months Tour" as being there found the moft proper for the purpofe of making cheefe. However, though this may be the cafe in a certain degree, there cannot be any difpute, but that excellent butter may be made in many fituations, where the paftures are comparatively new, and even where they have been but lately laid down to the ftate of grafs; as well as that cheefe of a good quality may be produced where the ground, ufed as paftures, has been long in the ftate of fward or old herbage. Indeed later experience feems to have fhewn that butter, equally good and rich in quality with that produced on the old fertile paftures, has been afforded while the cows were foddered in the ftalls on cut clover, rye-grafs, and other forts of green food.

The deterioration of land for the purpofe of the cheefe dairy, by the application of fuch fubftances of the manure kind as have a tendency to render it more fertile, as by the ufe of dung, or fheep feeding, &c.; is fuppofed by Mr. Rudge, in his Survey of Gloucefterfhire, to be probably owing to the introduction of fuch plants as did not grow there before, or the deftruction of fome that did. "The caufe does not," fays he, "originate with the cow, but the herbage on which fhe feeds. The fame cow, on two paftures feparated only by a hedge, will give milk of different qualities; from one fhall be made fine, rich, and clofe cheefe; while from the other fhall be made rank, "heaving," hollow, unpleafant to the palate, and unfit for the market."

It is further ftated on this curious and interefting fubject by the fame writer, that "in the parifh of Haresfield, two grounds adjoining each other were alternately ufed for the pafture of cows; while they were on one, excellent cheefe was made, but on the other, it was difficult to make any tolerably good. The latter had been lately well dreffed with manure which produced plants unfavourable to the dairy; and the dairy-woman herfelf remarked, that if the farmer continued to enrich the herbage with dung, fhe muft give up making." This fuggefts fome circumftances which fhould be regarded in the regulation of cow paftures, but which will be noticed in fpeaking of dairy management. See DAIRYING.

It is fuppofed that, "among the plants which are ufelefs or unfavourable to the making of good cheefe, are the following; the white honey-fuckle *(trifolium repens)*, the different kinds of crow-foot *(ranunculus)*, and wild garlic *(allium ampeloprafum)*, &c." The "white honey-fuckle is brought forward by manure and fheep-ftock," and is "a proof of good land, at leaft of land in a ftate of high cultivation, and hence has a tendency to raife the quality of the milk and make the cheefe heave." But that "all the fpecies of crowfoot "crazeys," or "butter cups," except the fweet wood crow-foot (as it is faid, found only in woods), are ufelefs, if not noxious. However their bloffoms may add to the beauty of the herbage, or give an apparent richnefs to the pafture, the milk is not," the writer fays, "indebted to them for colour, as is fometimes fuppofed, fince the cows never crop them, if they can avoid it." See CRAZEY and CROW-FOOT.

The garlic, which is "common in fome meadows, gives a difagreeable flavour to butter and cheefe; and it does not appear that cows much diflike or refufe eating it; perhaps in confequence of its being fo much blended with the grafs, they cannot help cropping a little." And in the autumn, "the decayed leaves, particularly of the afh tree, communicate a rank and bitter tafte to milk; when thefe, therefore, cover the ground, it is advifeable either to keep the cows in the yard, or, what is better, to rake the leaves off the pafture to the dungheap."

The poifonous quality of the leaves of the yew tree fhould conftantly prevent its being grown in or even near to fuch grounds as are ufed for cow paftures.

It has been remarked by doctor Anderfon, that there is no fet of experiments, which can be depended upon with any degree of certainty, whether the butter or cheefe dairy is capable of affording the better profit to the farmer, in cafes where the management is equally judicious and proper. It is however fuggefted, that, in each cafe, the moft valuable part of the milk is converted into an article of great ufe and importance as food; and that though the former may afford a con-

a confiderably higher price than the latter in the market, yet from the great difference in the quantity of the products, in the expence and trouble in the management, and in various other circumftances, it would feem that the real advantages are nearly equal. It has been ftated, he obferves, previoufly to the late great rife in the prices of thefe different articles, to amount, whether of butter and butter-milk, or of cheefe and whey, to nearly four-pence half-penny for each gallon of milk; which at prefent is perhaps little lefs than from fix-pence to fix-pence half-penny or feven-pence. It is however fuppofed, that in the neighbourhood of large towns, and other places where the demand for butter is conftantly extenfive, it may be more profitable to have a butter-dairy than one of the cheefe kind. But in all cafes of this nature much muft depend, in refpect to profit and advantage, on the care and exactnefs of the management which is employed in conducting the bufinefs. See DAIRYING.

It has been fuggefted, in an interefting paper in the fifth volume of "Letters and Papers of the Bath Agricultural Society," that when a dairy is eftablifhed, the undertaker may fometimes think it his intereft to obtain the greateft poffible quantity of produce, fometimes it may be more beneficial for him to have it of the firft quality, and at other times it may be neceffary to have both thefe objects in view, the one or the other in a greater or lefs proportion; it is confequently of importance that he fhould know how he may accomplifh the one or the other of thefe purpofes, in the eafieft and moft direct manner. To be able to convert his milk to the higheft poffible profit in every cafe, he ought to be fully acquainted with every circumftance refpecting the manufacture of butter as well as of cheefe; and it may in fome cafes happen that a certain portion of that milk may be more advantageoufly made into butter than into cheefe, while another portion of it would return more profit, if made into cheefe. See DAIRYING.

In fhort, the confequence and the credit of the dairy muft, under all circumftances, principally depend on the neatnefs of the management which is purfued, every part being kept perfectly clean, fweet, and in order, the floors being regularly rendered cool, by frequent wafhing with cold water, and the various utenfils well cleaned and fcalded after every time of being ufed.

DAIRY-*Farm*, in *Agriculture*, is that fort of farm which is chiefly of the grafs-land kind, confifting of meadow and pafture, with but little of the ground in the ftate of tillage; in which the profit of the farmer principally depends upon the dairy. In Chefhire, Gloucefterfhire, Wiltfhire, Buckinghamfhire, and fome of the midland diftricts, as well as in fome parts of Effex, Cambridge, Suffolk, and the county of Dorfet, &c. there are extenfive farms of this nature. In moft, if not all farms of this defcription, there fhould, however, always be a portion of the land under the ftate of tillage, in order that a fufficiency of grain, and ftraw for litter, may be provided for the teams, and at the fame time green cattle crops be raifed in due proportion to the number of cows which are kept, as it has been lately fhewn that in this way the dairy farmer may derive confiderably more profit and advantage than in the ufual old method of management. See DAIRYING.

It is ftated by Mr. Holland, that "the more general introduction of green crops, and of the practice of ftall-feeding for dairy cows, may certainly be reckoned among the moft confiderable improvements which have taken place of late years in the agriculture of Chefhire. With the dairy-farmer," fays he, "it is a principal object to increafe the quantity of his milk, and to continue it as long as poffible. This can in no way be more effectually done than by giving green food to his cattle; and he is informed by feveral intelligent farmers, that by this management the milk may be continued a month longer in the autumn than could be effected by trufting to the paftures only for a fupply of food." It is therefore conceived, that the importance of this circumftance in a dairy diftrict muft be fufficiently evident to every one who has in the leaft degree attended to it. And the refults of the ingenious experimental trials of Mr. C. Curwen in keeping milch cows in this way, with the view of affording milk in the winter feafon, have placed the benefits to be derived from it in fo clear a point of view, that there cannot be the leaft difficulty or doubt concerning it. See DAIRYING.

DAIRY-*Houfe*, in *Rural Economy*, a building or place erected for the purpofe of carrying on the bufinefs of dairying. Thefe forts of buildings fhould conftantly be fituated and diftributed in fuch a manner, in refpect to the other farm offices, as that labour may be abridged as much as poffible, and the greateft poffible convenience be obtained, while a due temperature is preferved in them. The chief points to be aimed at, in order to accomplifh thefe objects, are thofe, of having them fufficiently near the fheds or cow-ftandings, that the milk may be readily conveyed to them; the form being fuch as to combine well with the nature of the other erections; the door or entrance into the room deftined for the milk, being made through that of the fcalding room, which fhould have the copper for heating water and other purpofes placed in a fhed without it, that the heat may be kept at as great a diftance as poffible from the milk, a cock being fixed in the bottom of it, for conveying the heated water through a trough or pipe acrofs the fcalding room, in which another cock fhould be fixed, for the convenience of wafhing fmaller utenfils, paffing the wall into the milk-leads, pans, trays, or coolers, that whenever they are required to be fcalded, the boiling water may at once pafs through the whole range of them, or be detained at pleafure in any one of them, fo as to effect the bufinefs in the moft complete and perfect manner, being afterwards taken off by a fuitable drain made for the purpofe. The paffage for the water, through the wall of the dairy, fhould be in a trough of fufficient dimenfions to admit the difcharging of a pailful of milk into it with perfect fafety, having a hair fieve fo placed in it as that the whole of the milk of the cows may be made to pafs through it into the neceffary trays or coolers in which it is to ftand; as by this fimple contrivance, the neceffity of dirty men or boys entering the dairy-houfe is wholly prevented. There fhould likewife be a trough, pipe, or fome other fimilar contrivance, for the purpofe of conveying the wafte milk, whey, &c. from the dairy-houfe to the cifterns for containing the wafh for the pigs. Thefe conveniences have many of them been fuggefted by Mr. Young in his excellent "Calendar of Hufbandry."

Where thefe buildings are intended to become objects of ornament, and expence is not regarded, fituations fhould be felected fo as that the effects of them may be the moft pleafing and complete.

The regulation of temperature may be accomplifhed either on the plan fuggefted by doctor Anderfon, of having double walls and roofs; or by means of hollow walls; and for common purpofes, by the walls having a vacuity left, of eight or ten inches in width, between the lath and plafter, as fuggefted by Mr. London in his "Treatife on Country Refidences." Where a fpring, fountain, or *jet d'eau* can be fo contrived as to break or burft forth, in the centre of the principal room or apartment, it will not only afford a highly agreeable effect, but be of great convenience to the perfon who has the management of the bufinefs of the dairy.

In farm-dairies, it is neceffary for the buildings to vary ac-

cording

cording to the nature of the dairy bufinefs to be carried on in them, as whether they are ufed for butter, cheefe, or milk; and the fizes of them fhould be regulated by the number of cows which are to be kept. In the Gloucefter dairy-houfes twenty feet by fixteen are the ufual dimenfions for forty cows; and thirty feet by forty, for one hundred cows.

A well-conftructed butter-dairy fhould confift of three rooms, or apartments; namely, a milk-room, a churning-room, with neceffary apparatus; and a room for the different utenfils, and the cleaning and airing them in, when it may be requifite.

The cheefe-dairy fhould in the fame manner be conftituted of three rooms; one for the reception of the milk; another for the fcalding and preffing of the cheefe; and a third for the purpofe of falting it in. And in addition, there ought to be a room for the ftowing of the cheefe, which may conveniently be a loft made over the dairy. It is frequently at a diftance, which is inconvenient and troublefome.

The milk-dairy only requires two good rooms, one for the reception of the milk; and another for the purpofe of ferving it out in, and that of fcalding, cleaning, and airing the different utenfils.

It is utterly impoffible to conduct the dairy bufinefs with propriety and due advantage, except where a place fuitable for preferving the milk, and for performing the various operations in, be firft provided. In order that an equable temperature may prevail at all feafons of the year in this fort of building, a northern expofure has been fuggefted as the moft proper, and which fhould be dry and near a fpring or running water, that it may be rendered clean and fweet at all periods without difficulty. And where it is fo fituated, as that the action of the fun upon its roof and walls can be prevented by the fhade of trees or buildings, it is a circumftance of much importance to the fuccefs of the bufinefs.

From the general difficulty of obtaining thefe different requifites in the farm-houfe, it has been recommended that a detached building fhould be erected or converted to the purpofe. This need not, however, be the cafe where there is already a proper convenience, or an old erection that can be altered with facility, fo as to anfwer the intention.

The plan which a writer, who has beftowed much attention upon the fubject, has propofed, is, that it fhould be conftructed in a fort of range of narrow buildings, as fhewn in the ground plan at *fig.* 1. in *Plate* XII. of *Agriculture*, in which the middle divifion, A, is the proper milk-houfe or room; that fhewn at B, is intended to ferve as a room for cleaning, and laying up the different neceffary utenfils in; and that at C, is defigned as a ftore-room, in which the cured butter, and various other products, as well as the fpare dairy utenfils, may be fecurely kept, by being locked up. Near large towns it might alfo be employed as a place for keeping ice in, by being properly fitted up for the purpofe. In cheefe-dairies another room would be neceffary for the purpofe of falting and preffing; which might be added at either end, as moft convenient.

It is advifed that the walls of the middle divifion fhould be conftructed of brick, or ftone and lime, all round on the infide, but which need not be more in thicknefs than one brick in length, where that fort of material is ufed, or one foot in the cafe of ftone being employed; but the wall beyond this, which fhould be full fix feet in thicknefs, may be formed of fod on the outfide, being well rammed with earth within, fo as to fill up the fpace between the two walls. The firft or infide wall of this compartment may be raifed feven, eight, or more feet in height on the fides upon which the roof may be reared, where a loft above is not wanted, the end walls being carried up to the full height of the roof. The beft covering for the roof in this cafe, is fuppofed to be reed or thatch, which fhould not be lefs than three feet in thicknefs, being carried downwards fo as to cover the whole of the walls on each fide; but where thefe materials are not in plenty, they need not be applied to quite fo great a thicknefs. A wooden pipe fhould be fixed through the roof, exactly above the middle of the building, having fufficient length to rife a foot or more above it, which may occafionally ferve as a ventilator. The top of it fhould be covered fo as to prevent rain from getting through it, having a valve fo fixed in it, as to be capable of being opened or fhut at pleafure by means of a cord from below. There fhould likewife be a window on one fide for the admiffion of light, which fhould be conftructed in the manner fhewn at F G, *fig.* 2, in the fection of the building. And this opening fhould be clofed by means of two glazed frames, one on the outfide at G, and the other on the infide at F, which, together with the great thicknefs of the walls, the thatch of the roof, and of the buildings at the end, contributes to render the temperature of the room more equable at the different feafons of the year, by more effectually preventing the influence of the external air upon it. The fmall fpaces or apartments fhewn at R, S, are fimply cavities formed in the thicknefs of the partition walls, which may be employed for any ufe that may be convenient; the double doors in the paffages being defigned wholly for cutting off more perfectly all communication between the external air and the milk room, when either the great heat or exceffive coldnefs of it may render it neceffary. The thatch above thefe fmall fpaces, or rooms, fhould come one foot lower within than in the milk-room, in order more fully to prevent all communication of air from the outer apartments at the place where the couples for the roof are placed. At periods when the ftate of the air is temperate, the door at T may be generally left open to facilitate the entry to and from the milk-room, for common purpofes. All the doors open as fhewn by the dotted lines: and through each of thefe doors, as well as the outer doors of the rooms or apartments, B and C, an aperture or opening fhould be made of about a foot fquare, having a fmall door exactly fitted to it, which can be opened and fhut at pleafure. Likewife over the whole of the infide of each of thefe apartments, a piece of fine gauze fhould be ftretched, being covered with a fine netting of wire, fo that when the air is temperate, and the wind blows in a proper direction, by opening thefe little doors, a draught or current of air may be carried through the whole of thefe buildings, which will keep them fweet and dry, without admitting flies or other vermin. The whole of thefe apartments fhould be neatly plaftered, with lime on the infide of the walls and ceiling. Likewife the apartment A, at leaft, fhould be paved with flat ftones, which fhould be raifed fix inches higher than the furface of the ground without, having flanting gutters made to convey away readily water or any other liquid which may be accidentally fpilled. The walls quite round fhould be lined with fhelves of a convenient breadth, in ranges, one above another, on which the difhes may be placed; and a large table fhould ftand in the middle, as fhewn by the dotted lines in the plan; which, if made of ftone, is the moft cleanly and convenient of any fort of material. Beneath it a piece of the pavement, about a foot in breadth, fhould be raifed fix inches higher all round than the level of the floor, fo as to form a fort of trough or ciftern within it for holding water. This trough or bafon fhould be capable of being wholly emptied at pleafure by means of a plug fixed in a hole which opens into and admits the water to be difcharged into the common gutters.

The cleaning and repofitory room fhould be fitted up, by having

having ranges of ſhelves placed all round the walls, as well as tables and other neceſſary furniture put where they may be requiſite. In this the walls may be thinner than in the other caſe, and be wholly built of brick or ſtone, the thatch being likewiſe leſs thickly applied. There ſhould be ſet up in one corner a boiler, or cauldron, of ſufficient ſize for the dairy, for the purpoſe of heating the water for ſcalding the veſſels, being placed over a cloſe furnace, the flue of which ſhould be made to terminate in a chimney carried in a ſlanting manner over the door in the gable end above which it riſes, ſo as to afford a paſſage to diſcharge the ſmoke. This boiler is ſhewn at H, in *fig.* 1.

The third diviſion, or room, may be made uſe of for different purpoſes, as ſuggeſted above; but where ice is to be preſerved in it for the ſummer, which may often be found advantageous to the dairy, the walls ſhould be built in the ſame manner, and of the ſame materials, as thoſe in the firſt diviſion, or that marked A, as ſhewn by the dotted lines *i*, *k*, *l*, *m*; the thatch or reed being applied in the ſame thickneſs. And in this caſe there ſhould be firm poſts of wood placed in the floor, in the manner as ſhewn at *n*, *o*, *p*, *q*, ſo as to form a ſort of inner ſquare, with an open walk all round of two feet in breadth; wicker-work hurdles of a proper ſhape ſhould be placed within theſe poſts, being wholly compoſed of peeled wands, which have been previouſly dipped in coal-tar in a warm ſtate, in order to preſerve them from decay. The receptacle for containing the ice, being within this ſquare, is capable of being filled from the double doors at K L, by opening them at the time, and immediately cloſing them again, not to be reopened till the period of its being again neceſſary to fill it; the aperture between the doors being filled with ſtraw rammed ſo as to become firm, and thereby prevent the admiſſion of air. The ice ſhould be taken out as it may be wanted, by paſſing through the middle diviſion, or milk-houſe. Various advantages and conveniences, it is ſuppoſed, would attend this accommodation and contrivance, and the expence at the ſame time be but trifling. In this manner the products of the dairy would conſtantly be capable of being cooled to that degree, in the ſummer ſeaſon, which ſhould be found to give them their greateſt perfection. And the attentive and ingenious dairy-farmer would find ſuch an accommodation capable of other beneficial applications.

It is obvious that all the contrivances of this dairy-houſe, as deſcribed above, are ſolely intended to enable the careful dairy-farmer to preſerve his milk in a proper temperature in the ſummer as well as the winter ſeaſon, with the leaſt poſſible trouble and expence to himſelf; as it is well known, that any conſiderable variation in the degree of heat has a great tendency to derange the operations of the dairy, and conſequently to diminiſh the value of the products of it. It is found by experience, that if the heat be too great, the milk ſuddenly coagulates, without admitting of any ſeparation of the cream; and it becomes ſo ſuddenly ſour as to greatly injure every operation. While, on the contrary, when the milk is kept in too cold a temperature, the cream ſeparates from it in a ſlow manner, and with difficulty, acquiring a bitter diſagreeable taſte, the butter being ſcarcely able to be made to come at all; and when obtained, is of ſo pale a colour, ſo ſmall in quantity, ſo poor to the taſte, hard and brittle in its conſiſtence, and in every reſpect of ſo little value, as to bring a very low price at the market, in compariſon to what it would have produced had it been preſerved in a proper degree of warmth. In order, therefore, to avoid theſe different extremes as much as poſſible, the milk properly ſo called is, in this form of dairy-houſe, depoſited in the centre of the building, into which there is no direct acceſs immediately from the open air; nor even from the porch, except through double doors, one of which ſhould conſtantly be ſhut before the other is opened, whenever either the heat or coldneſs of the weather is exceſſive; but under other circumſtances, this precaution may be overlooked. The walls which encloſe this part of the building, being formed of ſuch a thickneſs, and of ſuch earthy materials, as well as the roof ſo thickly covered with thatch, as theſe ſubſtances are found to tranſmit heat and cold with leſs facility than any others, which can be eaſily had, conſequently a long continuance of either hot or cold weather could have no ſenſible effect in altering the temperature of this room or diviſion; and if it ſhould at any time acquire a ſmall degree of heat or cold more than was proper, and this were corrected by artificial means, it would retain that artificial temperature for a long time. Theſe are the principal objects deſigned to be acquired by this conſtruction of dairy-houſe.

The ingenious inventor further remarks, that from fifty to fifty-five degrees of heat on Fahrenheit's ſcale is about the average temperature that a building, conſtructed in the manner of the above, would naturally preſerve at all ſeaſons of the year in this climate, if not affected by external objects. But that, as the heat of the milk, if in conſiderable quantities, would tend in ſummer to alter the temperature of the air, there is no improbability but that it might in ſome caſes be raiſed in this way to a much higher degree than was proper. Therefore, as a convenient remedy for this inconvenience, the aſſiſtance of the ice-houſe has been had recourſe to, as by having a ſmall quantity of ice placed in the milk-room, when neceſſary, the heat may be quickly brought to the proper ſtate. In the two ſmall chambers adjoining the ice-houſe, or in the paſſage around it, the butter may be depoſited, and preſerved in a much cooler ſtate than even in the milk-room. Beſides this, other benefits may be derived from this additional diviſion of the building. It is likewiſe ſuggeſted, that if the cold ſhould ever become too great in the winter ſeaſon, it might be remedied either by means of a barrel of hot water, cloſely bunged up, being placed upon the table of the milk-houſe, and ſuffered to remain till it cools, or by having hot bricks laid down for the ſame purpoſe; which are much preferable to any kind of chaffing-diſh with burning embers in it, as preventing more certainly a bad taſte being communicated to the milk.

But dairy-houſes may be contrived and conſtructed on various other more ſimple and cheap forms; the ground plan and internal parts of one of which may be ſeen at *fig.* 3. in the ſame plate, in which A is the milk-houſe or room, the coolers for containing the milk being ſhewn at *a*, *a*, *a*; *b*, the ſlab for depoſiting the butter upon, when made up; *c*, *c*, *c*, the cocks for drawing off the milk from the coolers, one of which is ſo contrived as to ſerve two coolers, by having a ſhort piece of leaden pipe from the holes *o*, *o*, *o*, which are ſtopped by the plug *p*, made ſufficiently long to reach above the ſurface of the milk; *d*, a large cock, by means of which water can be thrown upon the floor, which is made to ſlope a little from that part; *e*, *e*, *e*, are likewiſe cocks fixed at the back parts of the coolers, for the purpoſe of letting in water; *f*, the door, which is latticed in the manner ſhewn at *fig.* 4; *g*, another door, which is commonly made uſe of, but which is made with pannels.

The churning-room is ſhewn at B, in which *h* is the fire-place; *k*, a boiler; and *l*, a large copper, which may be employed for the purpoſe of brewing.

The room for the purpoſe of airing and drying the different ſorts of dairy-utenſils is ſeen at C; and which may likewiſe

wife be made ufe of occafionally as a laundry; over the whole of thefe rooms, apartments for lodging the fervants may be made with much convenience, where they may be neceffary.

At *fig.* 5. is given an infide view of the milk-room of this dairy, at the end Q.

An ingenious dairy-farmer near Liverpool (Mr. Wakefield) has his dairy-houfe conftructed on this plan, which he finds to anfwer well, and be convenient.

It has been obferved by Mr. Marfhall, that the rooms of the Wiltfhire dairy houfes have commonly outer doors, which often open under a fort of pent-houfe, or inclofed lean-to fhed; which he confiders as convenient, and beneficial in affording fhade and fhelter, as well as a degree of coolnefs to the whole dairy building. And in particular cafes double doors are had recourfe to, the infide one being clofe-boarded, and that on the outfide open-paled, fomewhat in the manner of a common gate; in this way air is not only freely admitted when the weather is clofe and warm, but at the fame time dogs, poultry, &c. guarded againft. This he thinks an improvement which in all cafes would be of great advantage in the fummer feafon.

Another conftruction of farm dairy-houfe which is found ufeful, is fhewn at *figs.* 6 and 7, in the fame plate.

Befides thefe forts of dairies, there are others which are chiefly contrived as ornamental buildings, and at the fame time to be employed for the purpofe of preferving milk and butter, in attachment to country refidences. Thefe fhould always be planned and contrived with proper tafte, according to the nature and fituation of the particular place on which they are to be erected, and the circumftances which regard their management; being careful that they have a fufficient protection from too much heat in the fummer feafon.

At *figs.* 1 and 2, in *Plate* XIII. is reprefented an elegant dairy-houfe of this kind, taken from that of his grace the duke of Bedford's, at Woburn Abbey.

Dairy *Hufbandry*, is that kind of farm-management which principally relates to the bufinefs of dairying. It is a fort of hufbandry which is practifed in fome of its branches in either a greater or lefs degree, in almoft every diftrict of the kingdom; though there are but few in which it has attained to any very high ftate of excellence. So far as the bufinefs of cheefe-making is concerned, Chefhire, Gloucefterfhire, and Wiltfhire, in the fouthern parts of the ifland, and Ayrfhire in the more northern, are the moft diftinguifhed; while the counties of Effex, Cambridge, Dorfet, and Suffolk, are thofe which are the moft celebrated for the quality and quantity of their butter. In the northern part of the country, with the exception of the diftrict noticed above, Mr. Donaldfon confiders this fort of hufbandry as ftill but in its infancy. In order to the carrying on of this kind of hufbandry with full effect and advantage, a fufficiency of room in the dairy-houfe, for the convenience of performing all the various operations without embarraffment, in proportion to the number of cows, is effential. And befides this, great knowledge and fkill in the management, with much attention to cleanlinefs, are requifite. It has been remarked by the writer already mentioned, that whoever has attended to the operations carried on in a well-conducted bufinefs of this nature, even for a fhort time, muft have been fatisfied that fkill was as requifite in the perfon who directed, as attention and alertnefs in thofe who executed them. In fact, he thinks, it muft have been evident, that without a knowledge of the beft modes proper to be adopted, under different circumftances, and a regularity, method, and prompt attention to their execution, bufinefs of this kind muft foon go into the utmoft confufion and diforder.

In the moft modern and improved manner of performing this fort of bufinefs, much regard is likewife neceffary in the farmer to the abundant cultivation of the moft proper and ufeful kinds of crops of the green fort, for the food of the cows. See Dairying.

Dairy-*Leafe*, in *Agriculture*, is that fort of covenant or agreement under which lands in fome diftricts are let, for the purpofe of being conducted under the dairy fyftem. Leafes of this kind are common in Dorfetfhire and fome other counties. See Lease.

Dairy-*Maid*, in *Rural Economy*, a name applied to the woman who has the chief management of a dairy. This fort of perfon fhould always be perfectly regular and fteady, and at the fame time fully converfant with all the various proceffes which are neceffary to be performed in managing the bufinefs. She is fometimes denominated dairy-woman. See Dairying.

Dairy-*Man*, a name frequently applied to fuch men as have dairy-farms, or who are extenfively engaged in the dairy bufinefs.

Dairy-*Utenfils*, are all fuch kinds of implements as are employed in the operations of the dairy. It is advifed by an excellent writer, that, from their ufe, they fhould in general be made of wood. Though lately, fome, from an affectation of a fuperior degree of neatnefs and elegance, have had recourfe to veffels which are formed of lead or of common earthen-ware, for different ufes in the dairy. But that, as the acid of the milk is found to be capable of decompofing and diffolving a portion of lead, brafs, or copper, and with thefe of forming a compound of a poifonous nature, fuch forts of veffels muft be highly pernicious in the bufinefs of the dairy, and of courfe fhould be banifhed from fuch fituations. And this is equally neceffary with refpect to any of the common forts of earthen-ware, which, from their being glazed with lead, and the glazing being foluble in this fort of acid, are improper in the fame degree. It is likewife fuggefted that caft-iron has been recommended as a proper fubftitute for thefe; but as this metal is alfo foluble in the acid of milk, though the folution be not poifonous, yet, as it may affect the tafte of the products of the dairy, and render their qualities different from what they would have naturally been, veffels of this kind fhould likewife be fet afide. In fact, excepting veffels of true porcelain, or glafs, which are much too expenfive, it is fuppofed there are none that can with propriety be fubftituted for wooden ones in this intention. It is obvious that neither china nor glafs veffels can ever come into general ufe for dairy purpofes; nor is it neceffary for the dairy-farmer to think of any other fort of difhes for his milk than thofe of wood; as thefe, when properly managed, can be kept as clean and fweet as is needful for fuch veffels. This circumftance is indeed fo well underftood, that wooden dairy utenfils are almoft in general ufe through the whole country, and can of courfe be readily procured in almoft every fituation, of fuch qualities, forms, and conftructions, as may be the moft proper under the particular circumftances of the cafes.

It has lately been found that flate is an ufeful material for the purpofe of making milk coolers, and in fome of the midland diftricts the common flag flate has been employed in this way. The better forts would feem, however, to be the moft proper.

The moft material utenfils for the purpofes of the dairy-farmer are milk-fkeels or creaming-difhes, milk-pails, milk-cowls or coolers, milk-ftrainers or fieves, cheefe-ladders, lading-difhes, fkimming-difhes, churns, cheefe-vats and cheefe-preffes; the expences of which muft evidently vary in

in different fituations, but in the county of Gloucefter they are ftated to be as below :

	£	s.	d.
Cheefe-tub or cowl - - - -	1	10	0
Milk-bowl and fieve - - - -	0	3	0
Barrel-churn, iron work and ftand - -	2	12	0
Common barrel-churn - - - -	2	10	0
Harland's improved barrel-churn - -	5	5	0
Set of vats, lined with lead - - -	3	3	0

Or, which is better :

Whey-fkeel - - - - -	1	1	0
Milk-fkeel - - - -	0	8	4
Milk-pail - - - - -	0	6	8
Butter-fkeel - - - -	0	5	0
Cheefe vat - - - -	0	3	0
Lade-bucket, or ("gawn") gallon - -	0	1	6
Skimming difh - - - -	0	0	10
Pair of butter-fcales - - - -	0	3	0
Brafs pot for warming milk in - -	2	0	0
Cheefe-prefs and cloths - - -	10	10	0

Confequently a fet of this fort of utenfils, with one churn, will amount to about twenty or twenty-two pounds; but for a dairy of eighteen or twenty cows, a greater number of feveral of the articles will be required, as two whey-fkeels, three milk-fkeels, three milk-pails, fix cheefe-vats, and two butter-fkeels.

DAIRYING, the art of making cheefe, butter, and other dairy products. This is a fort of management which is only adapted to particular fituations and circumftances. See Dairy.

It has been obferved as plain and decifive, "that much of the profit, in this fort of management, muft conftantly depend upon the care and affiduity that is beftowed in conducting the different proceffes of the bufinefs." And that "it fhould only be undertaken by thofe who are capable of paying the moft minute attention to every department of it; as, unlefs this becomes a fixed and eftablifhed principle in the farmer's mind, the chance of fuccefs is precarious and uncertain. To truft wholly to common fervants, in this fort of bufinefs, is always hazardous, and never to be practifed where it is carried on to any extent."

The firft thing to be attended to in an undertaking of this nature is, to choofe cows of a proper fort, according to the mode of dairying which is to be practifed. Among this clafs of animals it is found, by experience, that fome kinds give milk of a much thicker confiftence and richer quality than others; nor is this richnefs of quality neceffarily connected with the fmallnefs of the quantity yielded by cows of nearly an equal fize; it therefore behoves the owner of a dairy to be peculiarly attentive to this circumftance. In judging of the value of a cow for the purpofe of the butter dairy, it ought rather to be the quantity and the quality of the cream produced from the milk of her in a given time, than the quantity of the milk itfelf, that fhould determine the farmer. This is a circumftance that will be fhewn in future to be of more importance than is generally imagined: but where cheefe is the main object, both the quality and proportion fhould be confidered. The fmall cows of the Alderney breed afford the richeft milk hitherto known; but individual cows in every county may be found, by a careful felection, that afford much thicker milk than others; thefe therefore ought to be fearched for with care, and their breed reared with attention, as being particularly valuable in the intentions of the dairy farmer.

It has been remarked, by an able practical writer, that on "comparing the milk of two cows, in order to judge of their refpective qualities, particular attention fhould be paid to the time that has elapfed fince their calving; as the milk of the fame cow is always thinner foon after calving than it is afterwards, as it gradually becomes thicker, though generally lefs in quantity, in proportion to the time the cow has calved. The colour of the milk, however, foon after calving, is richer than it afterwards becomes; but this, efpecially for the firft two weeks, is a faulty colour that ought not to be regarded."

The next thing that is neceffary in this fort of management is that of being provided with a fufficiently large and convenient dairy-houfe, whether the object be cheefe or butter. It fhould be fo proportioned to the number of cows, as that there may be fufficient convenience for performing all the neceffary operations without embarraffment; and much attention muft be paid to cleanlinefs in every thing that relates to it, fuch as the fhelves, floors, and different implements which are made ufe of, by daily fcalding, fcrubbing, rinfing, and drying, in order to prevent any fort of acidity taking place; as, without due regard in thefe refpects, it is impoffible that the produce can be of fuperior quality, or fuch as will keep fweet and good for any length of time, &c. Cleanlinefs may indeed, fays Mr. Donaldfon, be faid not only to be neceffary in dairy-hufbandry, but to be the foundation of it, and the moft effential and indifpenfable part of good management. And it is likewife added, that "a farmer may be in poffeffion of the moft valuable breed of cows, and thefe be fed in the richeft paftures; but unlefs cleanlinefs prevail in the dairy, his butter or his cheefe will never ftand high in general eftimation." See Dairy, and Dairy-*Houfe*.

Next to the fize and fituation of the dairy-houfe, and to keeping it and the utenfils clean, is that of fkill and attention in the general management. In fhort, without a knowledge of the beft modes proper to be adopted under different circumftances, and a regularity, method, and prompt attention to their execution, it is obvious that the bufinefs muft foon run into confufion, and become unprofitable.

In refpect to the neceffary expence of the proper apparatus for this purpofe, fuch as churns, milk-pails, cheefe-cloths, trays or pans, brafs milk-kettle, and boiling copper, &c. exclufive of the cheefe-prefs, for a dairy of twenty cows, it will moftly be about fifty pounds. For fuel either coal or wood will anfwer, but faggots preferved in the ftack one year are much the beft material that can be employed.

Sorts of Cows proper for dairying.—It is fuggefted that, on the richer and more fertile paftures, it is probable that the large and middle-fized breeds of cows may be the moft beneficial, efpecially where both cheefe and butter are made; but in fuch as do not poffefs fuch a high degree of fertility, the middle and fmaller breeds may prove more profitable to the dairy-farmer. Some fuppofe the long-horned breed not well fuited for the dairy; but experiments that have been carefully made fhew that more cheefe may be produced from the fame quantity of milk in that breed than in thofe of the fhort-horned, as well as more butter from the fame quantity of cream. And in Ireland, the Craven breed afford more butter than the Holderneffe. Of the fmaller breeds, the Alderney, the Suffolk-polled, and the Kiloe or Scotch breeds, may be found the moft profitable. In the dairies of the Ifle of Wight, as well as thofe of fome parts of Hampfhire, the Alderneys prevail much, and are highly efteemed for butter. Two-thirds of the Suffolk-polled breed, and one-third Alderney, have been recommended as conftituting an excellent dairy-ftock, the milk

milk being mixed. And it is added, that, befides the milk, there is another object to be attended to in forming a cow-ftock, which is, that they be fufficiently hardy for the fituation. In this refpect the long-horned breed is much fuperior to the fhort-horned cattle, from the difference in the thicknefs of their hides; and the Scotch is probably better than either. This breed and the long-horned are therefore the moft proper for bleak expofed fituations. And as many of the mixed-breeds afford excellent milkers, and in moft of the genuine breeds there are great differences in the individuals, it may be the beft mode, in order to eftablifh a good dairy-ftock, whether for butter or cheefe, for the farmer to breed from fuch cows, of whatever kind they may be, as he has found from experience the beft for the purpofe, without being at the trouble of purchafing the more expenfive breeds. In this cafe good bulls fhould always be procured, as much is fuppofed to depend on the male.

In the vale diftrict of the Gloucefterfhire dairy-farmers, it is remarked by Mr. Rudge, that thofe neat cattle are in general kept which have the beft bags, and which are the moft likely to afford the largeft fupply of milk; the beauty of the animal being of courfe an inferior confideration, though not wholly overlooked, or neglected; as it is well known, that when the cows are turned off to fatten, thofe will improve in the moft fpeedy manner which have the beft forms, and confequently the feweft coarfe points about them. Although feveral varieties have been introduced, in fome of the old dairies, the Gloucefterfhire breed is ftill much valued; yet few ftocks are met with in the county in which there is not fome mixture, and perhaps ftill fewer in which the "genuine old ftock is preferved." It is added, that this breed differs but little in its general appearances from that of the Glamorganfhire, except in colour, which is a dark red or brown: the bones are fine, the horns of a middling length, white in colour, having a black tip at the ends, the bag by no means flefhy, but large, affording a great deal of milk, and continuing it for a long time, when on good keep. They have generally a flight ftreak of white running along the back, and conftantly on the rump end of the tail. They are light in the carcafe, commonly weighing from eight to nine fcore the quarter. Their milk is faid to be lefs rich in quality than in fome other breeds.

In the higher vale diftrict of the fame county, the improved long-horned fort from the ftock of Bakewell and Fowler are in the moft eftimation. And on the Cotfwolds, the principal occupiers encourage the fame kind. Thofe of the Devonfhire fort are likewife admired by fome for this ufe in thefe fituations, being tolerable milkers, good breeders, little confumers, and excellent feeders. The merits of this breed, as milkers, have probably not been fufficiently attended to and afcertained by proper trials; as it has been found, by a perfon in the vicinity of Devizes, Wiltfhire, who, as well as his father before him, has been in the habit of letting cows to men who fupply that town with milk; and who buys all his cows, and confequently, can have no partiality for any particular fort, having, at different times, had all kinds; that the milk-men have uniformly, for the laft thirty years, given the preference to the Devonfhire fort at the fame price, as being, on the whole, the beft milkers. The Suffolk duns are found in fome inftances, in this diftrict, milking indifferently well, and having much propenfity to fatten.

But a crofs of the Gloucefterfhire breed with that of the long-horned is found, on the experience of an extenfive cow-keeper, who raifes his own ftock, to anfwer his purpofe in the moft perfect manner; fome of this fort of cows affording from two to three gallons or more of milk at each time of milking.

In Chefhire the cows of the dairy-farmers are compofed of almoft all the different forts or breeds: and, according to Mr. Holland, fome perfons prefer "half-bred cattle from the Lancafhire and prefent Chefhire; others prefer a breed between the Chefhire and Lancafhire; and there are thofe who prefer a half breed between the Chefhire and the Welfh; whilft a crofs between the Lancafhire and Holderneffe, and one between the Lancafhire and Welfh, have alfo their advocates."

It is ftated, that on the better forts of land, "a breed partaking of the fhort-horned Holderneffe, or the long-horned Lancafhire, feems to be the moft prevalent." While, on the inferior forts of land, "a middle-fized fhort-legged breed, with a crofs of the Welfh in them, are the moft preferred." In fhort, the "fize, form, and production of the udder," is there more attended to than "the figure and bulk of the beaft." The improved breeds do not appear to have anfwered. The cows that are bred *upon the land* are found, it is faid, to anfwer beft. The cows kept for the purpofe of the Chefhire dairies, it is fuppofed, will not, on the average, weigh more than feven fcores the quarter, when fattened. It is found and admitted in this diftrict, that this fort of ftock is often kept too long without changing. Where cows are found to be good milkers, they are, indeed, too frequently kept for that ufe, until of little value for any other. "An old cow may give more milk than a young one, but it is not of fo rich a quality; but this is not the whole, "for an old beaft will require more and better food to keep her in a condition, and in full milk, than one of a proper age; which is thought to be between four and ten years; but there are many who think that a milker is not in her prime till five years old." See Cow.

In the rearing of young cow-ftock in this diftrict, the calves are felected from the beft milkers, a cuftom which applies to the males as well as the females. Thofe are chiefly fixed upon which are calved early, as in February, or early in the following month; being, for the firft three weeks, moftly kept on the cows; but afterwards ferved with warm green whey, fcalded whey and butter milk mixed, or hard fleetings; of which latter forts of food, about five quarts conftitute a meal for each calf: but with the firft kind or green whey, water is often mixed, with oat-meal, wheat, or bean-flour, in the proportion of about a quart to forty or fifty quarts of the liquid, which is fufficient for a meal for ten calves. And where flax feed is had recourfe to, a quart of the boiled feed is given, in addition to the whey, for the fame number of calves. A gruel made with oat-meal and butter-milk, in mixture with a little fkimmed milk, is likewife fometimes ufed for the fame purpofe. One or other of thefe kinds of food being at firft ferved night and morning, but in the latter part of the time only once in the day; as, till the calves are turned out to grafs, and for fome time afterwards, being, on the whole, continued for about ten weeks. A good pafture is referved for the calves in the firft winter, a little hay being given them night and morning, as foon as hard weather takes place. In the fecond winter they have the dry food of ftraw, having an open fhed near the pafture for an occafional fhelter, but which is better in the farm-yard. The fummer following, the heifers, which are two years old offs, are put to the bull. In the third winter, in fome cafes, they lie out in the fields till near calving time; but in others, which is much better, they are tied up at the fame time with the milking cows; being, in each cafe, fed with ftraw, night and morning, till about a month before calving. See Calf-*Rearing*.

Proper kinds of Food for the Cows.

In order to make cows give abundance of milk, and of a good quality, they muſt at all times have plenty of food. Graſs is the beſt food yet known for this purpoſe; and that kind of graſs which ſprings up ſpontaneouſly on rich dry ſoils is the beſt of all. But ſo little attention has hitherto been beſtowed on this ſubject, Dr. Anderſon ſays, that he does not know of any ſet of experiments that have ever yet been made, with a view to aſcertain the effects of any of the natural graſſes that ſpontaneouſly ſpring up in abundance on our fields, either on the quantity or the quality of the milk of cows, and few that have been attempted even with regard to thoſe plants that have been cultivated by art as green forage for them; though it be well known, that ſome particular kinds of plants ſtrongly affect the taſte and alter the quality of particular products of milk. It is, indeed, in all caſes, confidently aſſerted, that old paſtures alone can be made to afford rich butter or cheeſe. This, however, he knows from his own repeated experience to be a popular error, as he has frequently ſeen much richer butter made by one perſon from cows that were fed in the houſe chiefly with cut clover and rye-graſs, than that which was made by others where the cows were fed on very rich old paſtures. Mankind, ſays he, are in general diſpoſed to throw the blame of every failure upon ſome circumſtance that does not reflect on themſelves as bad managers. Hence it is, that the graſs of a farm is often blamed for the want of richneſs of the butter produced upon it; when, if the circumſtances were fully inveſtigated, it would be found to be occaſioned by the unſkilfulneſs of the dairy-maid, or the want of attention in the choice of proper cows.

If, in the management of the cows in the ſummer ſeaſon, the temperature of the climate be ſuch as to permit them to graze at eaſe throughout the day, they ſhould be ſuffered to range on ſuch paſtures at freedom; but, if the cows are ſo much incommoded by the heat, as to be prevented from eating through the day, they ought, in that caſe, to be taken into cool ſheds for protection; where, after allowing them a proper time to ruminate, they ſhould be ſupplied with abundance of green food freſh cut for the purpoſe, and given to them by hand frequently, in ſmall quantities, freſh and freſh, ſo as to induce them to eat it with pleaſure. In very warm climates, where the heat is extremely oppreſſive to cows, and the flies are exceedingly troubleſome, ſheds open on one ſide, the roof being only ſupported there by pillars, would not, the writer thinks, afford them ſuch effectual ſhelter as they would require. In theſe caſes, the ſheds ſhould be walled upon both ſides, and be left open only at the two ends, which, if properly placed, would produce a continued ſtream of air throughout the whole building that would prove highly ſalutary to the cattle. When the heat of the day is over, and they can remain abroad with eaſe, they may be again turned into the paſture, where they ſhould be allowed to range with freedom all night during the mild weather of ſummer. See Dairy.

It is adviſed by Mr. Rudge, in his account of the management of the cows in Glouceſterſhire, that the dairy farmer ſhould mark out thoſe incloſures for cow-paſtures, which are known either from a previous examination of the herbage, or from the experience of others, to be the moſt ſuited to the purpoſe of producing good milk, without its being of a rank quality.

In the winter keeping of the cows, there are different methods in uſe in different diſtricts; but in the ſouthern parts of the iſland they do extremely well in warm ſheltered yards, with open ſheds, eſpecially when plenty of litter, ſuch as ſtraw, ſtubble, fern, or other ſimilar materials, can be afforded for keeping the whole well bedded. In the northern diſtricts, however, and wherever a proper ſupply of litter cannot be obtained, it is better to have them tied up in ſtalls, with raiſed ſtandings, and ſunk paved floors immediately behind them, for receiving the dung and urine, as by theſe contrivances they may be kept perfectly clean without litter, and at the ſame time be more warm, as two cows may be confined in the ſame ſtall. The ſtalls ſhould be kept conſtantly clean and well ſweeped out.

It has been obſerved to be of great conſequence to the produce of a dairy, that the cows ſhould not drop their calves too early in the ſeaſon. When that happens, they fall off in the quantity of milk in the autumn, when, owing to its ſuperior richneſs, it is more valuable than at any other period. From the end of March to the end of April is the beſt time, in the more northern diſtricts, that a cow can drop her calf, as ſhe ſoon gets into good condition on the early graſs, and yields a greater quantity of milk in the courſe of the ſeaſon than thoſe that calve either conſiderably earlier or later. But in the ſouthern parts of the iſland it is an advantage for them to calve much earlier. In Cheſhire, the above period is the uſual time, only a few cows dropping their calves in January or the following month.

With regard to the management of cows in ſummer, there is a ſimilarity in almoſt every diſtrict. They are uſually kept on the oldeſt paſtures on the farm: when theſe are at a diſtance from the farm-houſe, they are milked on the paſtures; but otherwiſe they are brought home morning and evening for that purpoſe.

But in winter the dry cows, that is, ſuch as do not give milk, are fed on ſtraw in the ſtraw-yard; while thoſe that are in milk, or are near calving, are kept in ſome incloſed paſture, or in ſheds erected for the purpoſe, and maintained chiefly on hay. Where artificial graſſes, turnips, cabbages, or potatoes, are cultivated on a large ſcale, the milch cows have a daily and regular allowance of one or other of theſe ſorts of food during the winter and ſpring months. Potatoes, in particular, are admirable food for cows; as, while they tend to keep them in good condition, the quantity of milk is generally abundant and of good quality, both in reſpect to richneſs and flavour. In ſhort, the dairy-farmer, in every part of the iſland, will find it for his intereſt to be attentive in feeding his cows, whatever the ſort of food may be which he employs. It may be ſtated that of theſe different ſorts of food, the diſtribution for ſummer and winter may be in the following manner:

For the ſummer, red clover, ſaintfoin, lucern, burnet, and tares, may be made uſe of with great advantage. But in employing the firſt, great care ſhould be taken to guard againſt injury either to the animals, or the quality of the butter or cheeſe being rendered of a bad kind or flavour by it. On poor chalky hills, the ſecond will be of the greateſt importance to the dairy-farmer. Lucern and tares ſhould always be employed in the way of ſoiling; in which method, where the cows have proper ſhade and ſufficient water, they will be found of the utmoſt uſe, as they afford a very certain ſupply of food and go a great way. Beſides, the cows are found to milk well in this management, where proper attention is beſtowed in the foddering of them. It is ſuppoſed a method that can hardly be too ſtrongly adviſed, by a writer in the thirty-ſecond volume of the Annals of Agriculture. In Mr. Baker's experiments, a middle-ſized cow was found to conſume in the proportion of from ninety to one hundred pounds of green lucern in the courſe of twenty-four hours.

But for winter, hay, ſtraw, cabbages, turnips, carrots, potatoes, cole, malt-grains, &c. ſhould be had recourſe to. The keeping of cows with hay is in general too expenſive to afford

afford the dairy-man an adequate profit: therefore, in order to leffen the expence of this fort of keep, other articles of the green and root kind muft be had recourfe to; till near the period of calving they may be fupported on frefh threfhed ftraw in cribs in the fold-yard, beginning with the worft, and gradually proceeding to that which is of a better quality. Thofe in good condition fhould have the worft ftraw; but when it is not of the beft kind, and the cows are of a valuable fort, they may be fed once a day with cabbages, turnips, or other fimilar forts of food, in bins for the purpofe. When within about a month or fix weeks of calving, a little hay fhould be given at night, or the allowance of green food increafed, and on the day of calving they fhould be confined and have warm water, and for a fortnight after calving be very well fed with both hay and green food, in fuitable divifions for the purpofe. In this view the cabbages are extremely valuable, as the produce on the acre is large, and they afford much milk; but care muft be taken to pick off all the dead and decayed leaves, which may be given to the young ftock. A middle-fized cow will confume from one to two hundred pounds in a day; but feventy is fuppofed as much with ftraw as can be paid for by the produce. In Mr. Dodfworth's trials, as afferted by Mr. Young in his fix months' Tour, a cow of fifty ftone was found to eat twelve ftone of this fort of food in the fame time. An extent of this kind of crop, proportioned to the dairy, fhould always be provided. The only objection to turnips as food for milch cows, is their impairing the flavour of the butter; but they are a fort of food that affords much milk, and without this, or the preceding green food, a large dairy cannot, perhaps, be fupported to much profit. A larger weight of this food than the former is confumed in the fame time.

In refpect to carrots and potatoes, they are very advantageous forts of food for cows, where they are raifed in great abundance; but even in fuch cafes they can only be made ufe of with profit as a feed once or twice in a day with other forts of food. It is out of the queftion that a cow could pay for being kept wholly on them. Cole, as being fed off in the field, can only be had recourfe to on the firm dry foils; but in fuch fituations it is a very profitable crop applied in this way, efpecially when ufed in fucceffion to turnips in the fpring months. Malt-grains, where they can be had in plenty, are ufeful with other forts of food, as producing a large proportion of thin milk. They are confequently better for the purpofes of the milkman than the dairy-farmer.

In the Chefhire practice of dairying, the ufual dry foods are, according to Mr. Holland, wheat, barley, and oat-ftraw, hay, and crufhed oats; the two former kinds of ftraw are, however, found to make cows go dry much fooner than the latter: and there is, likewife, another effect, which is generally admitted, as depending upon this fort of keep, which is, that the cream of the cows, which have been thus fed, will require more than the ufual time in churning. Wheat-ftraw, notwithftanding, is confidered much more wholefome than that of barley, as having lefs of fuch effects attending it.

Thofe cows which, at the period of houfing, are not expected to calve until rather late in the fpring, are fed with oat-ftraw, and fometimes hay, while they are milked; having wheat, or barley-ftraw, afterwards given them. On the contrary, the more forward in calf cows, on being taken up, are put either to wheat or barley-ftraw, according as circumftances may fuit; oat-ftraw not being given them until the whole of the other ftraw is confumed. This, however, depends much on the price of the markets for grain. In either cafe, the ftraw fodder is continued until about three or four weeks before the time the cows are expected to calve; when they have hay in the proportion of from two to two and a half hundred weights per week each cow. And from the time the cows have calved, until they are turned out to grafs, a portion of ground, or crufhed oats, is given them twice a day; in general, from twenty to twenty-five quarts per week, to each cow. And chopped ftraw has frequently been made ufe of in years when hay has been fcarce, by many farmers, a little corn being mixed with it; two fmall fodderings of hay being only given in the day, and occafionally a foddering of ftraw at night.

In the management of the cows, they are turned out into an *out-let*, (a bare pafture field contiguous to the buildings,) about ten o'clock in the morning, and houfed again about four in the afternoon, throughout the whole winter, in which they have, however, no fodder. It is, indeed, fuggefted, as the practice of many dairy-farmers, after the cows have been turned into the out-let or pafture, and begin to manifeft a difpofition to be taken up again, to let them into the yards and be houfed, which, in cold or wet weather, is confidered a much better practice than that of fuffering them, as is ufually done, to ftand fhivering with cold in the field without fhelter or protection.

It is ftated as a matter of much confequence, to turn the cows out to grafs in good condition, in order, as the term is, that they may "ftart well;" as where a cow is not in good condition, when turned out to grafs, or has been too much dryed with barley-ftraw, it is a long time before fhe gets into full milk.

It is ftated by John C. Curwen, efq. in the fifth volume of Communications to the Board of Agriculture, that much advantage has been found in his winter milk-dairy, from the practice of combining fteamed chaff and ground oil-cake with different forts of green food. He has found, from actual experiment, that, when ground and boiled with chaff, the cake is more productive of, and increafes the quantity of the milk much more than when given in the ordinary manner. And, befides, there is a confiderable reduction in the daily expence of the keep. In this way, the keep of a middling-fized cow is ftated to be only five-pence halfpenny *per* day, thus:

	ftones.	*lbs.*	*d.*
Green food	2	0	$0\frac{1}{2}$
Boiled chaff	2	0	2
Oil cake ground	0	2	2
Straw from fix to	0	8	1
Total weight	4	10	$5\frac{1}{2}$

This is a method of feeding cows in the ftate of milking, which, from its convenience and beneficial effects, is much deferving of the dairy and cow-farmer's notice. We have ftated it more in detail in fpeaking of the bufinefs of the milk-dealer. See Cow-*Keeping*.

In refpect to the practice of giving green food, or what is termed ftall-feeding, cows, it is remarked by Mr. Holland, in his Survey of Chefhire, that the more general ufe of this fort of food, and that of confuming it in the ftalls or yards, are unqueftionably to be confidered as the greateft improvements which have lately taken place in the rural management of that diftrict. It is a principal object, he fays, with the dairy-farmer, to increafe the quantity of his milk, and continue it as long as poffible; which can be no way more effectually accomplifhed, than by the giving of green food to his cattle. The writer is, indeed, affured, by different fenfible farmers, that by this means the milk may be continued

continued a month longer in the autumn than could be done by trufting folely to the paftures for the fupply of food, which is a circumftance, the importance of which is fufficiently evident.

The forts of green food which are moft in ufe in this diftrict are the ox-cabbage, and the Swedifh turnip; the former being moftly given to the cows, when the after-grafs has been confumed; though fometimes in the fpring, to fuch cows as have newly calved. And when the paftures begin to fail, and the after-grafs is not ready, which often happens, efpecially in dry feafons, they have recourfe to the large fugar-loaf cabbage. The latter fort of food or turnips are given to the cattle, while feeding on ftraw in the winter feafon, and to which, as at this period no cheefe is made, there can be no objection to their ufe, in the fuppofition of their injuring the flavour of the milk.

It is ftated by the fame intelligent writer, that, on inquiry, whether the practice of ftall-feeding the milch cows might not be continued the whole year round, he has found the general opinion of farmers in the diftrict to be againft it; though it does not appear, he fays, that this is founded upon any decifive trials which have been made with a view to afcertain the point. It has, however, been fuggefted to him as an improvement on the prefent management, to let the cows ftand in their houfes during the heat of the day, in the fummer feafon; in which cafe, by giving them a few cabbages or tares, the milk would continue forming, and the cattle be defended from the gad-fly, which, by tormenting them in the fields, frequently injures the milk both in quantity and quality.

In the practice of Mr. Curwen, above alluded to, various other articles of green food were had recourfe to with advantage; fuch as kohlrabi, red turnip, and cole, the laft of which was found excellent in promoting a flow of milk, as well as for continuing as a food.

But, whatever kinds of green or fucculent food may be ufed in the way of feeding dairy-cows, it is remarked, by a late writer, that experience has fhewn that great advantage may be derived from varying it as much as poffible, probably on the phyfiological principle, that the novelty of ftimulus is the moft powerful in exciting the action and promoting the fecretions of the fyftem. The ufe of day and night paftures, which is a method employed in fome diftricts, may alfo partly depend, it is fuppofed, on this principle, and partly on that of better fhade and water. This mode, according to Mr. Wedge, is in ufe on the Chefhire dairy-farms.

In Chefhire, and moft of the other dairying diftricts, the cows are ufually taken up into the cow-houfes, fheds, yards, or other places, towards the middle of November, or as foon as the weather begins to fet in unfavourably. And, as it is fuppofed, that when the cows are kept to their milk too long, they are rendered lefs profitable in the following feafon; it is common there to permit them to become dry about ten weeks before the time of their calving. Where they are well fed, this is, however, wholly unneceffary. See Cow.

It may be remarked, that, in the ftocking of pasture-lands with cows, it fhould always be done according to their goodnefs; fuch grafs-lands as afford, in rent, tythe, and taxes, twenty-feven or twenty-eight fhillings, may fupport, during the fummer feafon, in the proportion of a cow of fifty ftones to an acre and a half, with a few fheep. But in fuch as are not worth more than twenty fhillings, one cow to two acres may be often fully fufficient. But in this management the rule fhould be for the paftures never to be too clofely ftocked, or have too many upon them at a time. The intelligent author of the corrected Chefhire Report on Agriculture, ftates, that the quantity of land which is fufficient to keep one cow the whole year, muft, of courfe, vary with the quality and produce of different foils, and the fize and nature of the beaft; but that, probably, on the average, having regard to the quantity of hay and corn confumed, as well as to the grafs and ftraw, a cow, in the courfe of the year, will confume the produce of three ftatute acres of land.

In the care and management of a large dairy of cows, or, what, in moft of the dairy diftricts, is termed a *pack* of cows, there is almoft a conftant and unabated attention required. In Chefhire, it is the common rule, at the period of the cows calving, for the cow-man, or mafter of the dairy himfelf, to get up two or three times during the night, to fee that every thing is right. The racks, cribs, or mangers, are kept conftantly well cleaned; and great regard paid to the appetites of the different beafts, in order that the quantity of food may be fuitably apportioned. And after this, it is not unfrequently a practice with the mafter to go round himfelf, from ftall to ftall, immediately before he goes to bed, in order that he may add to or diminifh the quantity of fodder in the manner that may be neceffary.

The labour which is neceffary in the management of dairy bufinefs, muft evidently differ materially, according to convenience, and various other points of inferior confideration; but it is feldom poffible for an ordinary dairy-maid to manage a greater number of cows than fourteen or fifteen in any very perfect manner, particularly where the practice of making both butter and cheefe is had recourfe to. Where a greater number are undertaken, affiftance will be required in the dairy. And, as it is effential that the cows fhould not be kept longer in being milked than an hour, in which time one maid cannot milk more than five or fix cows, it is evident, that where fixteen or eighteen cows are kept in the ftate of milking, it will be neceffary to have the affiftance of two others at fuch periods; in which proportion the work of the dairy may be conftantly regulated.

Milking the Cows.

It has been ftated, as a general practice, that cows are only milked twice a day; but that, when "abundantly fed, they fhould, probably, be milked three times a day during the whole of the fummer feafon: in the morning early, at noon, and in the evening, juft before night-fall. For, if they be milked only twice in the twenty-four hours, while they have abundance of fucculent food, they will yield a much fmaller quantity of milk in the fame time, than if they were milked three times." It has, indeed, been obferved, by fome attentive inquirers, that a cow, in thefe circumftances, will give nearly as much milk at each time of milking, if milked three times, as if fhe were milked only twice. This is, however, a ftatement which has not probably been afcertained by the teft of experiment. But it is fuppofed, there is no doubt of their giving more, though how much more has not been fully decided. Nor has it been afcertained whether it would be advantageous, in any cafe, to have the cows milked four times, or oftener; or what effect frequent milking produces on the quality of the milk. In fpeaking of the practice of procuring milk for the purpofe of fale in large towns, fome experiments were ftated on this fubject. See Cow-*Keeping*.

In the choice of perfons for milking the cows, great caution fhould likewife be employed: for, if that operation be not carefully and properly performed, not only the quantity of the produce of the dairy will be greatly diminifhed, but its quality alfo very highly debafed; for, if all the milk be not thoroughly drawn from a cow when fhe is

 milked,

milked, that portion of milk which is left in the udder feems to be gradually abforbed into the fyftem, and nature generates no more than to fupply the wafte of what has been taken away. If this leffened quantity be not again thoroughly drawn off, it occafions a yet farther diminution of the quantity of milk generated; and fo on it may be made to proceed in perpetual progreffion from little to lefs, till none at all is produced. In fhort, this is the practice in all cafes followed, when it is meant to allow a cow's milk to dry up entirely, without doing her hurt. In this manner, therefore, the profits of a dairy might be wonderfully diminifhed; fo that it behoves the owner to be extremely attentive to this circumftance if he wifhes to avoid ruin. It ought to be a rule without an exception, never to allow this important department to be entrufted, without controul, to the management of hired fervants; as cows fhould always be treated with great gentlenefs, and foothed by mild ufage, efpecially when young and ticklifh, or when the paps (teats) are tender: in which laft cafe the udder ought to be fomented with warm water before milking, and touched with the greateft gentlenefs, otherwife the cow will be in danger of contracting bad habits, becoming ftubborn and unruly, and retaining her milk ever after. A cow never lets down her milk pleafantly to the perfon fhe dreads or diflikes. The udder and paps fhould always be wafhed with clean water before milking; but care fhould be taken that none of that water be admitted into the milking-pail. The importance of this is ftill more manifeft from many circumftances which take place in refpect to milk; and many of which, in fo far as they refpect the dairy, have been but little, if at all, noticed, though they have evidently much effect on the different proceffes and products refulting from them. See MILK and COW-*Keeping*.

In cafes where two milkings are only practifed in the courfe of the day, they fhould be performed about five o'clock in the morning, and about fix at night. And it is a practice which the dairy-maid or man fhould conftantly attend to with exactnefs, to examine the cows carefully after the milkers, where they cannot be fully depended upon, in order to afcertain that the operation has been effectually performed; as, under the contrary circumftances, lofs may not only be incurred in the richeft part of the milk, but the cows rendered dry before the proper period, and at the fame time made more liable to difeafes of the udder.

The average quantity of milk which is afforded by cows is very different in different circumftances, depending materially on paftures, feafon, and the mode of winter keeping; but in the principal cheefe diftricts, from eight to twelve quarts per day is the ufual proportion; though many cows will give twice thefe quantities for fhort periods; but when cows give more than the firft of thefe quantities at a meal, it is remarked that they "either go off their milk much fooner, or elfe their milk has lefs richnefs in it, than that of others which do not give fo large a quantity."

Managing of the Milk, for Butter.

In refpect to the managment of the milk, it may be obferved to be a circumftance of the utmoft importance to the fuccefs of the dairy-bufinefs, as upon its being properly executed, the profit of the farmer muft in a great meafure depend.

It is the common practice in moft of the dairy-diftricts of the kingdom to pafs the milk, as foon as it has been brought from the cows, through fome fort of ftrainer, which is ufually a hair or fine wire fieve, firmly fecured in the bottom of a large bowl formed of wood; or where the dairy is extenfive, a fort of trough fixed conveniently for the purpofe, fo as to difcharge the milk into the trays or other veffels deftined for the purpofe of receiving it. See DAIRY-*Houfe*.

The trials which have hitherto been attempted, in order to afcertain or determine the moft beneficial manner of difpofing the milk, with the view of producing and throwing up the cream in the greateft abundance, and the fhorteft fpace of time, have been but few, and thofe made without much accuracy or correctnefs. But as the oily portion of the milk which conftitutes the butter feems to be diffufed throughout the whole fubftance of the milk, and to be entangled among the ferous and cafeous particles of it, in fuch a manner as to be thrown up to the furface only in confequence of its having a lefs fpecific gravity than the part which is commonly denominated milk, while in the ftate of reft; it would appear that the method of placing it, which is moft adapted to the proper, full, and expeditious creaming, is that of depofiting it in very fhallow bafons, pans, trays, or leads, fo as not to ftand at a greater depth than about three inches; as under fuch circumftances, there will be the leaft refiftance afforded to its rifing, and at the fame time the greateft poffible extent of furface for it to collect upon. And experience has fhewn, in fome of the beft butter dairy-diftricts, that, in this way, a large proportion of cream is afforded, and at the fame time, in confequence of the more expeditious manner in which the milk cools, the tendency of it to run into the ftate of acidity, in warm feafons, is much checked and reftrained.

It has not been fhewn, as the refult of experiments, what kind of fubftance is the moft proper and advantageous in this intention, for the forming of fuch veffels of; though there can be little doubt, but that wood, ftone, or flate, are any of them preferable to lead, not only from their being capable of being kept clean with much greater facility, and being lefs apt to fur, but from their being more fafe, in confequence of their not being liable to be acted upon by the acid of the milk.

The following obfervations have been made by doctor Anderfon with refpect to milk: firft, that, of the milk that is drawn from any cow at one time, that which comes off at the firft is always thinner, and of a much worfe quality, than that which comes afterwards; and the richnefs goes on, continually increafing, to the very laft drop that can be drawn from the udder at that time. Few perfons, fays he, are ignorant, that milk which is taken from the cow laft of all at milking, which is often provincially called ftroakings, is richer than the reft of the milk; but very few are aware of the greatnefs of the difproportion between the quality of the firft and the laft drawn milk from the fame cow at one milking. The following facts refpecting this circumftance were, he fays, afcertained by him many years ago, and have been confirmed by many fubfequent experiments and obfervations. Having taken feveral large tea-cups exactly of the fame fize and fhape, one of thefe tea-cups was filled at the beginning of the cow's milking, and the others at regular intervals till the laft, which was filled with the dregs of the ftroakings. Thefe were each weighed, the weight of each cup being fettled fo as to afcertain that the quantity of milk in each was precifely the fame; and from a great number of experiments, frequently repeated with many different cows, the refult was in all cafes thus:—the quantity of cream obtained from the firft drawn cup was, in every cafe, much fmaller than from that which was laft drawn; and thofe between afforded lefs or more as they were nearer the beginning or the end. It is unneceffary here to fpecify, he fays, thefe intermediate proportions; but it is proper the reader fhould be informed, that the quantity of cream obtained from the laft drawn cup, from fome cows, exceeded that from the firft in

in the proportion of fixteen to one ; in other cows, however, and in particular circumftances, the difproportion was not quite fo great, but in no cafe did he find it fall fhort of the rate of eight to one. Probably, upon an average of a great many cows, it might be found to run as ten or twelve to one. And that in the next place, the difference in the quality of the cream, however, obtained from thefe two cups, was much greater than the difference in the quantity. In the firft cup the cream was a thin tough film, thinner, and perhaps whiter, than the paper on which he writes: in the laft, the cream was of a thick butyraceous confiftence, and of a glowing richnefs of colour, that no other kind of cream is ever found to poffefs. And laftly, that the difference in the quality of the milk, that remained after the cream was feparated, was, perhaps, ftill greater than either, in refpect of the quantity or the quality of the cream. The milk in the firft cup was a thin blueifh liquid, like as if a very large proportion of water has been mixed with ordinary milk; that in the laft cup was of a thick confiftence and yellow colour, more refembling cream than milk, both in tafte and appearance. From this important experiment it appears, he fays, that the perfon who, by bad milking of his cows, lofes but half a pint of his milk, lofes in fact about as much cream as would be afforded by fix or eight pints at the beginning; and lofes, befides, that part of the cream which alone can give richnefs and high flavour to his butter, when that is the object of the dairy-man. Many other ufeful corollaries may, he fays, be drawn from it, fome of which will occur in the fequel.

In the fecond place, he fays, that if milk be put up in a difh, and allowed to ftand till it throws up cream, that portion of cream which rifes firft to the furface is richer in quality, and greater in quantity, than what rifes in a fecond equal portion of time; and the cream that rifes in the fecond interval of time is greater in quantity, and richer in quality, than that which rifes in a third equal fpace of time; and that of the third than the fourth, and fo on : the cream that rifes decreafes in quantity and declines in quality continually, as long as any rifes to the furface. Thefe experiments not having been, in this cafe, made with fo much accuracy as in the former, he has not been able to afcertain the difference in the proportion that takes place in equal portions of time ; but they have been fo often repeated as not to leave any room to doubt the fact ; and it will be allowed to be a fact of no fmall importance in the management of the dairy. It is not certain, however, but that a greater quantity of cream may upon the whole be obtained from the milk, by taking it away at different times ; but the procefs is fo troublefome, as not to be counterbalanced by the increafed quantity obtained : if, indeed, an additional quantity be thus obtained, which is not as yet, he thinks, fully certain.

In the third place, it is added, that thick milk always throws up a fmaller proportion of the cream it actually contains to the furface than milk that is thinner; but that cream is of a richer quality ; and if water be added to that thick milk, it will afford a confiderable greater quantity of cream than it would have done if allowed to remain pure ; but its quality is at the fame time greatly debafed. This is, he believes, a fact that every perfon attentive to a dairy muft have remarked ; but he has never heard of any experiment that could afcertain either the precife amount of the increafed quantity of cream that might thus be obtained, or of the ratio in the decreafe of its quality : but it afcertains the effects, at leaft, of mixing water with milk in a dairy ; and the knowledge of this fact will enable attentive perfons to follow that practice which they think will beft promote their own intereft.

In the fourth place, that milk which is put into a pail, bucket, or other proper veffel, and carried in it to any diftance, fo as to be much agitated, and in part cooled, before it be put into the milk-pans to fettle for cream, never throws up fo much nor fo rich cream, as if the fame milk had been put into the milk-pans directly after it was milked. In this cafe, it is believed, he fays, that the lofs of cream will be nearly in proportion to the time that has elapfed, and the agitation it has fuftained, after being drawn from the cow; but he is not yet in poffeffion of any experiments that fufficiently afcertain how much is to be afcribed to the time and the agitation taken feparately. From the whole of the facts and circumftances, the ingenious author thinks the following corollaries feem to be clearly deducible. 1ft. That it is of importance that the cows fhould be always milked as near the dairy as poffible, to prevent the neceffity of carrying and cooling the milk before it be put into the difhes: and as cows are much hurt by far driving, it muft be a great advantage in a dairy-farm to have the principal grafs-fields as near the dairy, or homeftead, as poffible. 2dly. That the practice of putting the milk of all the cows of a large dairy into one veffel, as it is milked, there to remain till the whole milking be finifhed, before any part of it is put into the milk-pans, feems to be highly injudicious, not only on account of the lofs that is fuftained by agitation and cooling, but alfo, more efpecially, becaufe it prevents the owner of the dairy from diftinguifhing the good from the bad cow's milk, fo as to feparate thefe from each other, where it is neceffary. He may thus have the whole of his dairy-product greatly debafed by the milk of one bad cow for years together, without being able to difcover it; as the author once faw a cow that gave milk which could never be made to yield any butter at all, though it had the appearance of being very rich milk. The perfon who fold that cow had had her feveral years, along with a good many others, without having fo much as had any fufpicion of this peculiarity. It was only difcovered when fhe came into the poffeffion of a perfon who had but one cow. A better practice, therefore, would be, to have the milk drawn from each cow feparately, put into the creaming-pans as foon as it is milked, without being ever mixed with any other. Thus would the careful *dai*, or perfon that fuperintends the dairy, be able on all occafions to obferve the particular quality of each individual cow's milk, as well as its quantity, and to know with precifion which of his cows it was his intereft to difpofe of, and which of them he ought to keep and breed from. 3dly. That if it be intended to make butter of a very fine quality, it will be advifable in all cafes to keep the milk that is firft drawn feparate from that which comes laft; as it is obvious, that, if this be not done, the quality of the butter will be greatly debafed, without much augmenting its quantity. It is alfo obvious, that the quality of the butter will be improved in proportion to the fmallnefs of the proportion of the laft-drawn milk that is retained, fo that thofe who wifh to be fingularly nice in this refpect will do well to retain only a very fmall proportion of the laft-drawn milk.

The writer here further remarks, that to thofe owners of dairies who have profit only in view, it muft ever be a matter of trial and calculation, how far it is expedient for them to carry the improving of the quality of their butter, at the expence of diminifhing its quantity. In different fituations, prudence will point out different kinds of practice as moft eligible ; and all perfons muft be left, after making accurate trials, to determine for themfelves. It is likewife a confideration of no fmall importance, to determine in what way the inferior milk that is thus to be fet apart, where fine butter is wanted, can be employed with the greateft profit. In the

the highlands of Scotland, he fays, they have adopted, without thinking of the improvement of their butter, a very fimple and economical practice in this refpect. As the rearing of calves is there a principal object with the farmer, every cow is allowed to fuckle her own calf with a portion of her milk, the remainder only being employed in the dairy. To give the calf its proportion regularly, it is feparated from the cow, and kept in an inclofure along with all the other calves belonging to the fame farm. At regular times cows are driven to the door of the calves' inclofure, where the young ones fail not to meet them. Each calf is then feparately let out, and runs directly to its mother, where it fucks till the dairy-maid judges it has had enough, when fhe orders it to be driven away, having previoufly fhackled the hinder legs of the mother, by a very fimple contrivance, to oblige her to ftand ftill. Boys drive away the calf with fwitches, and return it to the inclofure, while the dairy-maid milks off what was left by the calf. Thus they proceed till the whole of the cows are milked, and thus do they obtain a fmall quantity of milk, it is true, but that milk of an exceeding rich quality; which, in the hands of fuch of the inhabitants as know how to manage it, is manufactured into the richeft marrowy butter that can be any where met with. This richnefs of the Highland butter is, he obferves, univerfally afcribed to the old grafs the cows feed upon in their remote glens; but it is in fact chiefly, he conceives, to be attributed to the practice here defcribed, which has long prevailed in thefe regions; and perhaps in fome meafure to the nature of the beaft. Whether a fimilar practice could be economically adopted elfewhere, he does not take upon him to fay; but doubtlefs other fecondary ufes might be found for the milk of inferior quality; on fome occafions, it might be converted into butter of an inferior quality; on others, it might be fold fweet, where the fituation of the farm is within reach of a market town; on other occafions, it might be converted into cheefes, which, by being made of fweet milk, would be of a very fine quality, if carefully made; and ftill other ufes might be devifed for its application. One mode of managing milk, by means of which the inferior kinds of it might, on many occafions, efpecially within reach of towns, be difpofed of to great advantage, is however mentioned, which is this: Take common fkimmed-milk when it has begun to turn four, put it into an upright ftand churn, or a barrel with one of its ends out, or any other fimilar convenient veffel. Heat fome water, and pour it into a tub that is large enough to contain with eafe the veffel in which the milk was put. Set the veffel containing the milk into the hot water, and let it remain there for the fpace of one night. In the morning it will be found that the milk hath feparated into two parts; a thick cream-like fubftance which occupies the upper part of the veffel, and a thin ferous watery part, that remains in the bottom; draw off the thin part (called wigg) by opening a ftop-cock placed for the purpofe clofe above the bottom, and referve the cream for ufe. Not much lefs than the half of the milk is thus converted into a fort of cream, which, when well made, feems to be as rich and fat as real cream itfelf, and is only diftinguifhable from that by its fournefs. It is eaten with fugar in fome places, and is efteemed a great delicacy, and ufually fells at double the price of frefh fkimmed milk. It requires practice, however, to be able to make this nicely; the degree of the heat of the water, and many other circumftances, greatly affecting the operation. Thefe things practice beft difcovers.

And 4thly, that if the quality of the butter be the chief object attended to, it will be neceffary not only to feparate the firft from the laft drawn milk, but alfo to take nothing but the cream that is firft feparated from the beft milk, as it is this firft rifing cream alone that is of the prime quality. The remainder of the milk, which will be ftill fweet, may be either employed for the purpofe of making fweet milk-cheefes, or it may be allowed to ftand, to throw up cream for making butter of an inferior quality, as circumftances may direct.

5thly. That, from the above facts, we are enabled to perceive that butter, of the very beft poffible quality, can only be obtained from a dairy of confiderable extent, when judicioufly managed; for, when only a very fmall portion of each cow's milk can be fet apart for throwing up cream, and when only a very fmall proportion of that cream can be referved as of the prime quality, it follows, that, unlefs the quantity of milk was, upon the whole, very confiderable, the quantity of prime cream produced would be fo fmall, as to be fcarcely worth the while of manufacturing feparately.

6thly. That, from thefe premifes, we are alfo led to draw another conclufion, extremely different from the opinion that is commonly entertained on this fubject; *viz.* That it feems probable that the very beft butter could only be with economy made in thofe dairies where the manufacture of cheefe is the principal object. The reafons are obvious: if only a fmall portion of the milk fhould be fet apart for butter, all the reft may be made into cheefe, while it is yet warm from the cow, and perfectly fweet; and if only that portion of cream which rifes during the firft three or four hours after milking is to be referved for butter, the rich milk, which is left after that cream is feparated, being ftill perfectly fweet, may be converted into cheefe with as great advantage nearly as the new-milked milk itfelf. But as it is not probable that many perfons could be found who would be willing to purchafe the very fineft butter made in the manner above pointed out, at the price that would be fufficient to indemnify the farmer for his trouble in making it, thefe hints are thrown out merely to fatisfy the curious in what way butter poffeffing this fuperior degree of excellence may be obtained, if they choofe to be at the expence: but for an ordinary market, he is fatisfied, from experience and attentive obfervation, that if, in general, about the firft drawn half of the milk be feparated at each milking, and the remainder only be fet up for producing cream; and if that milk be allowed to ftand to throw up the whole of its cream, even till it begins fenfibly to tafte fourifh; and if that cream be afterwards carefully managed, the butter thus obtained will be of a quality greatly fuperior to what can ufually be obtained at market, and its quantity not confiderably lefs than if the whole of the milk had been treated alike. Among other reafons that induced him to feparate about the half of the milk is the following. Whilft he was employed in making experiments on milk, it chanced, that among his cows there was one which had miffed having a calf that feafon, and ftill continued to give milk. Her milk, as is not uncommon in thefe circumftances, tafted fenfibly falt. On trying the different parcels of that milk, however, it was perceived that the firft-drawn milk was extremely falt to the tafte, and that the laft was perfectly fweet. On an after-trial, made with a view to afcertain what proportion of the milk was falt, it was found that the faltnefs decreafed gradually from the beginning, and was entirely gone when near the half of the milk was drawn off, fo that all the laft-drawn half of the milk was quite fweet. He intended to have tried if other naufeous taftes that fometimes affect milks, fuch as that from turnips, cabbages, &c. was particularly confined to the firft-drawn milk or not; but other avocations prevented him from afcertaining this fact. He, therefore, concludes,

concludes, that this is the practice which he thinks moft likely to fuit the frugal farmer, as his butter, though of a fuperior quality, could be afforded at a price that would always enfure it a rapid fale. In the extenfive and fuccefsful practice of fome butter dairies, it has been found beneficial, in the winter feafon, to add hot water to the milk immediately as it comes from the cow, in the view of making it yield the cream more fully.

With regard to the degree of heat which is neceffary for the due feparation of the cream, few trials have yet been made; but from what has been done, it is believed by Dr. Anderfon, that when the heat is from 50 to 55 degrees on Fahrenheit's thermometer, the feparation of the cream from milk, which is the moft important operation of the dairy, proceeds with the greateft regularity, and in the moft favourable manner. It is, therefore, thought that this will be found to be the temperature that ought to be aimed at: but it is not pretended to decide with precifion; a confiderable degree of latitude, in this refpect, may, perhaps, be allowable; from the beft obfervations, it feems to be highly probable that when the heat exceeds 60 degrees, the operations become difficult and dangerous; and when it falls below the 40th degree, they can fcarcely be carried forward with any degree of economy or propriety. Till farther experiments, therefore, afcertain the exact point, it may, he thinks, be taken as a fafe rule that the heat fhould be kept up, if poffible, between the 50th and 55th degree; and, in order to afcertain this, a thermometer, graduated by Fahrenheit's fcale, fhould be hung up perpetually in the milk-houfe, to give notice to the owner of any alterations in the temperature of the air that may affect his intereft.

It has not yet been afcertained in any fatisfactory manner, what is the length of time that the milk fhould remain in the pans or trays, in order to afford the cream in the largeft quantity before it is feparated. Some fuppofe that this fhould depend upon the particular views of the dairy-man, and the degree of heat that is prefent at the period. In a moderately warm temperature of the air, if very fine butter be intended, it fhould not be allowed, the Doctor fays, to ftand more than fix or eight hours. For ordinary good butter it may fafely be let ftand twelve hours or more; but where the dairy is fo large as to afford a fufficient quantity of cream, and where the very beft butter is intended, (the milk being to be converted to fome other ufe while yet fweet,) it may be feparated after ftanding only two, three, or four hours. "In the general management of dairies, milk is, he fays, never fkimmed more than once; but in the county of Effex, as well as fome others, it is the common practice to fkim it three or four times, or till no more cream rife. In the bufinefs of feparating the cream from the milk there are two methods purfued: that moft generally practifed is to fkim it off with a fkimming-difh, made either of tin or of wood. The other is adopted only where leads or cifterns are common, and where the milk is ufed for making fkim milk or two-meal cheefes; and, of courfe, before it coagulate, or acquire any degree of acidity. Towards the centre of the ciftern there is a hole or pipe, which, before the milk be put in, is fhut with a wooden ftopper that rifes feveral inches above the furface of the milk. When the milk is wanted for any of the purpofes above-mentioned, a veffel is placed under the pipe, and the ftopper drawn up fo far as to allow the milk to run off, but fo gently, as that the furface of the cream may not be broken. The milk being thus gradually drained off, the cream finks down, till it at laft refts on the ciftern; when the veffel containing the milk being removed, and another placed for the purpofe of receiving the cream, the ftopper is entirely drawn out, and the cream drops into the veffel." The firft of thefe methods, the Doctor fays, "requires a dexterity of manipulation that can be acquired by practice alone; but it is of great importance to the fuccefs of the dairy that it be well done; for, if any part of the cream be left, the quantity of butter will be diminifhed, and if any part of the milk be taken, its quality will be debafed."

After the cream has been "thus feparated from the milk, it ought to be immediately put into a veffel by itfelf, to be kept till a proper quantity be collected for being made into butter: and no veffel can be better adapted for that purpofe than a firm neat-made wooden barrel, in fize proportioned to the extent of the dairy, open at one end, with a lid exactly fitted, to clofe it. In the underpart of this veffel, clofe to the bottom, fhould be placed a cock, for drawing off from time to time any thin ferous part of the milk that may chance to be generated; for fhould this be allowed to remain, it acts upon the cream in a powerful manner, and greatly diminifhes the richnefs of the quality of the butter. The infide of the opening of the barrel fhould be covered with a bit of clofe fine wire, or filver gauze netting, to keep back the cream, while the fcum is allowed to pafs; and the barrel on its ftand fhould be inclined a little forward in the top, to allow the whole to run off in a perfect manner.

In refpect to the length of time it may be kept in thefe veffels with advantage before it is churned, it is very different in different cafes; but about Epping, in Effex, according to Mr. Abdey, as ftated in the Annals of Agriculture, which has been long in high repute for the fuperior quality of its butter, "the cream is feldom kept above three or, at fartheft, four days," but always till there is a certain degree of acidity in it, either natural or artificial, as without that they cannot infure a good churning of butter; fome keep a little old cream for this ufe, others ufe a little rennet, and fome a little lemon juice. And it was practifed in a large dairy in Suffolk, which had a high character for making butter of a fuperior quality, when the butter was to be fent directly to market, to churn the cream the fecond or third day; but when it was to be falted, to keep it a day or two longer, or till it had acquired a certain degree of acidity. The dairywoman, who had had a long and extenfive experience, accounted for her conduct in this refpect, by obferving that butter made from frefh cream was much better and pleafanter to the tafte, but that it would not take in the falt fo well, or keep fo long, as that made from cream that had been longer kept. It has been fuggefted by Dr. Anderfon, that thofe "who have had little experience in the dairy, believe that no butter can be of the fineft quality, except that which has been made from cream that has not been kept above one day; but this is a very great miftake. So far indeed is this opinion from being well founded, that it is in very few cafes that even tolerably good butter can be obtained from cream that is not more than one day old. The feparation of butter from cream only takes place after the cream has attained a certain degree of acidity. If it be agitated before that acidity has begun to take place, no butter can be obtained, and the agitation muft be continued till the time that the fournefs is produced; after which the butter begins to form. In fummer, while the climature is warm, the beating may be, without very much difficulty, continued, until the acidity be produced, fo that butter may be got; but in this cafe the procefs is long and tedious, and the butter is, for the moft part, of a foft confiftence, and tough and gluey to the touch. If this procefs be attempted during the cold weather in winter, butter can fcarcely be in any way obtained, unlefs by the application of fome great

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degree of heat, which fometimes affifts in producing a very inferior kind of butter, that is white, hard, and brittle, with very little tafte, and almoft unfit for any culinary purpofe whatever." The intelligent dairy-farmer fhould not of courfe attempt to imitate this practice, but allow his cream to remain in the veffel appropriated for keeping it, until it has acquired that proper degree of acidity that fits it for being made into butter with great eafe, and by a moderate degree of agitation; by which procefs only very fine butter can be prepared. It is added that the exact length of time cream may be kept, before it attains the precife degree of acidity that is neceffary to form the very beft butter, and after that period before its quality be fenfibly diminifhed, has not yet been well afcertained by any experiment that can be fully depended upon: "So little nicety," fays the above writer, "has been obferved in this refpect by practical dairy-farmers, even thofe who have a high reputation for making good butter, that few of them ever think of obferving any precife rule in this refpect, with regard to the different portions of their cream, feeing they in general make into butter all the cream they have collected fince the former churning, fo that the new and the old is all beaten up together; and he can find nothing like an uniform rule eftablifhed among them, as to the time that fhould intervene between one churning and another, that being ufually determined by local or accidental circumftances. He is himfelf inclined to believe, that if the cream be carefully kept, and no ferous matter allowed to lodge about it, a very great latitude may fafely be admitted in this refpect;" and though the exact length of time has not been determined, "it is certain that cream which has been kept three or four days in fummer, is in excellent condition for being made into butter;" and he is inclined to believe, that from three days to feven may be found in general the beft time for keeping cream before churning; though, if circumftances make it neceffary, a confiderable latitude in this refpect may be allowed. If the farmer has fuch a quantity of cream as may be worth his while to churn once every day, there is nothing to prevent him from doing it. He has only to provide a feparate veffel for holding the cream for each day he means it fhould ftand before churning; if three days, three veffels; if four days, four veffels; and fo on. Thus he may churn every day cream of three days old, or of four; or any other number of days old that he may incline. In the fame manner, if it were found that the cream of two, of three, or of a greater number of days gathering, was required to make a proper churning, it might be eafy fo to contrive it as to churn every day, as will be obvious to any one who thinks upon the fubject. In this manner, the operations of dairying may be kept perfectly regular and eafy.

It is not an unufual practice in Chefhire to churn the whole of the milk without feparating any part of the cream from it. After milking, it is cooled in quantities according to the heat of the weather in fummer, in feparate veffels for the purpofe, and a certain degree of acidity brought on. This is effected previoufly to its being put together, which is the cafe from time to time, in earthern cream mugs or jars. In thefe jars, which contain from four to fix gallons each, it is fuffered to ftand till it is what is there termed *carved*, or clotted in a proper degree for churning, which is judged fufficiently the cafe when the whole is coagulated and has acquired a fmall degree of acidity, which commonly, in warm weather, takes place in the courfe of a day or two. And the cream is warmed in the winter by the mugs being fet by the fire, in order to forward the *carving* or clotting of the milk. If the milk fhould not have been fufficiently cooled in warm weather, before it was put to the former meal, or if in the winter feafon the mugs have been fet too near the fire, the whole mafs becomes curdled, making, as they phrafe it, "go all to whig and whey," and to afterwards heave in the mug. And further, if in fummer, or when kept in a warm fituation, the milk is not churned within a day, or a little more, after it is fufficiently *carved*, a kind of fermentation and heaving likewife comes on; in both cafes the butter will be rank and ill-tafted; nor will the milk afford fo much butter, as when it has been properly managed and churned in due time. In this way they obtain a greater quantity of butter, though of an inferior quality. By careful management, however, efpecially if a portion of the firft-drawn milk be feparated, very good butter may, it is fuppofed, be obtained; but the practice, on many accounts, is not to be advifed.

In the fummer feafon, or while the cows are fed on grafs, it is not requifite to give butter that colour which is agreeable to the purchafer or confumer, by means of art; but in winter and fpring months, the dairy people find it neceffary, in order to pleafe their cuftomers, to alter that tallowy appearance, which is natural to butter in thefe feafons, which is effected by means of a little arnotto, which, after being reduced by trituration to as fine a powder as poffible, is blended and incorporated with the cream before it is put into the churn, in fuch proportions as, from experience, has been found neceffary for giving the requifite appearance or colour to the product.

After thus defcribing the different preparatory fteps which are neceffary to be regarded in the butter dairy, it will be proper to detail the practice which is ufually purfued in making that important article.

Making of Butter.

This is a product of the dairy, in the manufacture of which great nicety and attention are requifite, as has been feen above, in order to have it of the beft quality. It has been ftated, that there are two methods purfued with the milk, with the view of procuring the butter from it. In one, the oily part or cream is feparated from the milk, and in that ftate converted into butter, by means of agitation, in a proper veffel; while in the other, the whole of the milk is fubjected to the procefs. The particular advantages of thefe different methods of practice have not been fully ftated, nor have any comparative experiments, which we know of, been inftituted with the view of afcertaining, which of them has the fuperiority in refpect to the quantity and quality or flavour of the butter which is obtained. It is a point of management which, however, deferves attention, and which is capable of being decided without much difficulty or expence in the experiments. The beft mode has always appeared to us, to be that of ufing the cream in the ftate of feparation from the milk, both in the convenience and the goodnefs of the butter.

Churning.

It is extremely evident that while the oily or butyraceous part of milk is in the ftate of cream, the particles are not in a fufficiently concentrated ftate for producing an uniform fubftance, on account of the large portion of interpofing ferous fluid; confequently, in order to produce butter, it is neceffary to force out this fluid by means of continued agitation, a procefs which is termed *churning*. In which the cream or milk, after being feparated and prepared in the above manner, is put into the churn of the kind which is preferred, as there are feveral different forts employed in different places and agitated for fome time, in order to effect the feparation of the butter. And "from the practice generally

rally adopted in the beſt managed dairies of cooling the churn, by filling it for ſome time with cold water before churning in ſummer, and of warming it with ſcalding water when the weather is very cold in winter, and of putting in alſo cold or hot water among the cream in the churn occaſionally, according to the ſeaſon of the year," it is concluded by Mr. Donaldſon, " that cream poſſeſſing a proper temperature, whatever that temperature may be, is, among the moſt exact dairy-farmers, conſidered eſſentially neceſſary in the making of good butter; which being admitted, it muſt follow, that ſome churns may be better ſuited to the purpoſe than others:—As ſuch as admit a free ſupply of atmoſpheric air, and permit that which from the violent agitation has become over heated to eſcape, from their preſerving the medium temperature which, it would appear, cream, in the courſe of making into butter, ought to poſſeſs, than ſuch as are kept conſtantly ſhut up, or, in which the air is only allowed to enter or eſcape occaſionally by means of a ſmall aperture." The author of Practical Agriculture obſerves, that " it is probably on this account that the upright churn is ſtill preferred in ſome dairies."

And it is remarked, that in this proceſs, much greater nicety is required than moſt perſons ſeem to be aware of, as a few haſty irregular ſtrokes may render the whole of the butter of ſcarcely any value, which, but for this circumſtance, would have been of the fineſt quality. The owner of an extenſive dairy ſhould, therefore, be extremely attentive to this circumſtance, and be at great pains to procure a proper perſon for managing this branch of the buſineſs. See CHURNING.

In Cheſhire they moſtly employ churns of the upright kind in their dairies, which are in ſome inſtances improved by having a lever applied to them; in which caſes one end of it (which is ſupported by means of an upright frame) is connected with or attached to the end of the churnſtaff; the other end of it, being by means of a rod, connected with a crank in a toothed wheel, and worked by a pinion fixed upon the axis of a common winch. In this way the operation is capable of being performed with facility by a ſingle perſon. And in a ſingle inſtance Mr. Holland found a water wheel applied ſo as to work the churn; being ſo contrived as that the ſtaff of it can be made, at pleaſure, to give from one to a hundred and eight ſtrokes in a minute. And it is ſtated that the greateſt advantage has been experienced from this method of churning, ſo as to juſtify its introduction in all caſes where the ſituation of the dairy will admit of it. In the dairies of Glouceſterſhire they make uſe of both the hand and barrel churns, according to the quantity of butter which is to be made. See CHURN.

Preparation of the Butter.

When by the proceſs of churning, or keeping the cream conſtantly in a ſtate of motion, the butyraceous particles are ſeparated from the milk, and after being gathered and united to each other, the maſs is taken out of the churn and put into a large wooden bowl, or other convenient veſſel, with ſome cold ſpring-water which is perfectly pure; the dairy-maid preſſes and kneads it well with her hands, or, what is better, a wooden ſpoon with a ſhort handle, afterwards breaking it into as minute diviſions as poſſible; and, by rolling and preſſing it againſt the bottom and ſides of the baſon or other veſſel, expreſſes and forces out any milk that it may contain. Upon this being well performed, the goodneſs of the butter in a great meaſure depends. When it has been thus worked, the milky water is poured off, and an additional quantity of pure clean water put in; and the operations of kneading, breaking, and preſſing, are again renewed, and continued till the water which comes off at laſt appears ſcarcely tinged with milk, which is the only proper criterion by which to determine when the butter has been ſufficiently worked. And it has been obſerved, that a conſiderable degree of ſtrength, as well as of dexterity, is required in this manipulation. The principal thing wanted, is to force out the milk entirely, with as little tawing of the butter as poſſible; for, if the milk be not entirely taken away, the butter will infallibly ſpoil in a ſhort time; and if it be too much worked, the butter will become tough and gluey, which greatly debaſes its quality. Another method of making butter, practiſed in Holland, as ſtated by Mr Carew, in the " Agricultural Report of Middleſex," is this:—After milking the cows, the milk is put into pans till it is quite cold. It is then ſtirred two or three times a-day with a wooden ſpoon, to prevent the cream from ſeparating from the milk; and if it can be ſtirred till the ſpoon will almoſt ſtand in it, it is deemed ſo much the better. When it is found to be ſufficiently thick, it is put into the churn; and beaten for an hour. When the butter begins to form, a pint or more of cold water, according to the quantity of the milk, is poured in, to ſeparate the butter from the milk. When the butter is taken out of the churn, it is waſhed and kneaded till the laſt water is perfectly clear and free from milk. By this method it is ſuppoſed, that a greater quantity of butter is made from an equal quantity of milk; and the butter is ſaid to be firmer and ſweeter, and to keep longer, than that which is made in the ordinary mode which is in uſe in this country. The butter-milk is alſo thought preferable, and a churn is there thought better adapted to the purpoſe than a barrel. But in either method, good butter may be made with due care and attention.

A ſmall quantity of ſalt in moſt caſes is mixed with butter, even which is attended for immediate uſe; and when the butter is ſalted, whether it be with a view to keeping or for immediate ſale, the ſalt is applied as ſoon as the milk has been extracted or removed in the manner deſcribed above. Part of the butter is ſpread on the bottom of another baſon or ſkeel, which has been previouſly waſhed and prepared for the purpoſe; and a quantity of ſalt being ſtrewed over it, an additional layer of butter is then laid on; over this, another ſprinkling of ſalt, and ſo on alternately till the whole be ſalted to the proper degree, according to the uſe for which the butter is intended. When the whole is thus ſalted, the dairy-maid again preſſes, kneads, breaks, and works it in ſuch a manner as to make the ſalt mix intimately with it; and when ſhe thinks ſhe has fully effected this purpoſe, ſhe pours ſome ſpring or other cold water over the whole; and, by again working the butter, waſhes it free from the brine, and from any milky ſubſtance, which, by the ſalting, and the repetition of kneading, preſſing, &c. may have been expreſſed.

When theſe different operations of butter-making have been performed, all that remains neceſſary to be done is to weigh and make it up into the form in which it is moſt ſaleable. The uſual form in which it is expoſed to ſale is in rolls; but it is ſometimes made into circular cakes of about three or four inches diameter, and about an inch thick, and on the top of which figures are impreſſed by means of a wooden print carved for the purpoſe.

In moſt of the Cheſhire dairies the butter made up for ſale is formed into lumps, which are there termed *diſhes*; the weight of one of which is one pound and a half, or twenty-four ounces. In Lancaſhire the butter is uſually formed into pounds of ſixteen or eighteen ounces, in a round flat manner, with the impreſſion of a figure upon the top.

But in many of the midland and fouthern dairy diftricts, it is common to make it up, for the London market, into *lumps* of two pounds each.

After the butter, in well-managed dairies, is weighed and made up for market, it is ufually placed in cold water till the period for fending it to market takes place.

In regard to the quantity of butter produced from a given quantity of milk, it depends on a variety of minute particulars: as the quality of the milk, the age and quality of the paftures on which the cows are maintained, and whether the milk be allowed to ftand a fufficient time to throw up the whole cream which it contains. But, on a medium, four gallons of milk will produce fixteen ounces of butter; and the quantity which a dairy of cows of any magnitude, in regard to numbers, may be fuppofed to yield, may be rated at fix pounds each *per* week in fummer, and from four to five in winter, according to the manner of feeding them. In Suffolk they find that four gallons and a half of milk afford a quart of cream, which, when made into butter, weighs one pound and three-quarters. And Mr. Abdey, in the Epping practice, found the avarage quantity of butter made by a cow *per* week, to be four pounds, of fixteen ounces, and the whole in nine months, one hundred and fifty-fix pounds; befides the advantage of fix fhillings a piece for three pigs which were kept. His ftatement, as given in the Annals of Agriculture, is this:

	£.	s.	d.
156 *lbs.* at 10 *d. per lb.*	6	10	0
Calf,	0	18	0
3 pigs,	0	18	0
	8	6	0

But at the prefent price.

	£.	s.	d.
156 *lbs.* at 1 *s.* 3 *d. per lb.*	9	15	0
Calf,	1	5	0
3 pigs,	1	10	0
	12	10	0

In the Lincolnfhire Report on Agriculture, the average quantity of milk which affords a pound of butter is ftated to be eighteen quarts, where the hand-churn is employed, and fifteen quarts by the horfe one. But in the accurate trials of J. C. Curwen, efq. M.P., where oil-cake, in a fmall proportion, was made ufe of in feeding the cows, and a pendulum churn conftructed by Mr. M'Dougall employed; eight wine quarts of the ftrippings, and nine quarts and a half of a mixture of the whole milk, were found to give a pound of butter. This ftriking difference in the quantities is accounted for, partly from the large proportion of heifer's-milk, but more particularly from the ufe of the oil-cake in feeding the cows.

There is an inferior fort of butter often made from whey, where cheefe is the principal object of the dairy-farmer. The modes of conducting the procefs in this cafe are ftated by Mr. Donaldfon in the following manner: "In fome dairies the whole whey, when taken from the cheefe-tub is," he fays, "put into fkeels or other veffels, where it remains about twenty-four hours; when it is creamed, and the whey applied to the ufe of the calves and pigs, the latter of which are faid to thrive as well on it after the cream has been taken from it as before. And the cream, when fkimmed off the whey, is put into a brafs pan and boiled, and afterwards fet in pans or jars, where it remains till a fufficient quantity for a churning be procured, which in large dairie happens generally once, but fometimes twice in the week." In others, "the green whey is put almoft immediately from the cheefe-tub into the furnace-pan, where it is fcalded. When it acquires the proper degree of fcalding-heat, cold water, or fome white whey, is occafionally put in; this caufes the whey to break, and throw up a thick white fort of fcum, fomewhat refembling cream, which the dairy-maid keeps conftantly fkimming off as it rifes, and which fhe puts into cream jugs or jars, where it remains till the ufual time of churning. In the dairies where the green whey is fcalded, the runnings, except a little that is kept for the purpofe of forcing the green whey when fcalding to throw up the cream, are ufually fet in fkeels or jars, in the fame manner as the milk from the cows, and the cream when taken off being added to that procured by fcalding, is churned in the ordinary way." In the Chefhire dairies, the *thruftings* or white whey is in fome cafes fet in cream mugs to *carve*, and acidulate for churning, either by the warmth of the feafon, or of a room, in the fame manner as in making milk butter. But in other cafes the green and white whey are both heated together, in which cafe, or when the green whey is heated alone, (where the boiler is of iron, it is previoufly rubbed with butter to prevent the whey from *catching* or acquiring a burnt-like tafte) fuch a fire is kept as will make the whey as hot as poffible, without boiling; and as foon as that degree of heat has been acquired, the buttery matter, which the whey contains, breaks or feparates from it, and rifes to the furface. This commonly takes place in the courfe of about an hour; but when the whey is perfectly fweet, a little fouring is fometimes added to produce the breaking effect.

But in the Gloucefterfhire dairies, according to Mr. Rudge, the whey is immediately "removed from the tub or cowl into the receivers, which are made of an oblong fquare form fix or feven feet long, three wide, and from four to fix inches deep, with a tap-hole in fome part of the bottom to draw it off. The infide is lined with lead, and this affifts in keeping up a great coolnefs, fo neceffary in the hot months; for if it were left to a high ftate of temperature, it would become four in a few hours; but in this way it will ftand for twenty-four hours, and during that time it is generally fkimmed twice at leaft." The cream being churned in the ufual manner for butter, and the whey given to the hogs.

But in two experiments made for the purpofe of afcertaining the nature of making butter from whey, Mr. Robertfon found the refult the fame, though the procefs was differently conducted. In one the whey had ftood four-and-twenty hours after being taken from the curd before it was put to the fire; but in the other it was put on quite warm and frefh immediately from the curd; the quality as well as quantity were alike in both thefe methods.

It is afferted that the quantity of butter procured from whey is confiderable; in two inftances, where particular attention was beftowed to afcertain the fact, it was not lefs than about an ounce and a half from the gallon. In regard to the quality, it is unqueftionably inferior to that of butter, made from the cream of milk, or from the milk and cream churned together, but not fo much fo as ftated by Mr. Marfhall in his "Rural Economy of Gloucefterfhire," which is one-third. In the Report of the County of Leicefter, it is indeed obferved, "that whey butter fells for nine-pence per pound, when other butter fells from ten-pence to eleven-pence, and alfo, that eighteen cows will make about feventeen pounds, fixteen ounces each, of whey-butter per week; which is a circumftance Mr. Donaldfon thinks "that certainly merits the attention of thofe who are in the practice of making either *one-meal* or *two-meal* cheefes."

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In the dairy practice of Chefhire, where it is the cuftom to churn up the whey-cream three times in the week, the average produce of butter, which is afforded by "one dairy cow," is from eight to ten ounces weekly. And the difference of price from it and that of milk-butter is from a penny to two-pence the pound. But in Gloucefterfhire it is ftated to be three-pence in the pound inferior to milk-butter in the value at market.

Making of Cheefe.

This is a practice which requires much care and attention in the dairy-farmer, in order that the proper profit may be derived from it. There are many different forts of cheefe, as has been noticed in fpeaking generally of the nature of cheefe. In fome of the principal diftricts, where this article of food is made, they divide the kinds into the "*beft making one meal*," or "*coward*," *two meal* and *fkim cheefe*. The firft of thefe forts fhould be made of the whole meal of milk; but a portion is often fet by, to be fkimmed for butter at the next milking, and the milk then added to the new meal, from which a fimilar quantity is taken as before. This fort of cheefe is moftly made in the county of Gloucefter, and is either thick or thin, the former being ufually termed *double Gloucefter*, having about four to the hundred or fometimes fewer; and the latter about eight to the hundred weight. See Cheese.

The fecond, or two meal kind, is commonly made of one meal or portion of "coward," or clean milk, and one of fkimmed, but fometimes two portions of the latter are employed.

The third or fkim-cheefe is chiefly made where the main object is butter, and in which the milk is ufed after being two or three times fkimmed.

While the cows are at hay the beft-making cheefe is never attempted.

In this fort of procefs, as in moft of the other operations of dairying, there is a want of neceffary accuracy and precifion, as few experiments have been made, and thofe without much nicety or exactnefs, the whole being in a great meafure conducted at random by mere cuftom. The fame points of management are effential in all dairies, but they differ greatly in the minute particulars, on which much depends. The circumftances that demand attention in a more particular manner are, however, the feafon; the method of milking; the nature of the milk; the preparation of the rennet; the mode of colouring; the breaking and gathering of the curd; the management of the cheefe in the cheefe-prefs; the method of falting; the management in the cheefe-room; and fome mifcellaneous circumftances concerning its prefervation.

Proper Seafon.

With refpect to the firft, the beft feafon is during thofe months when the cows can be fed on the paftures; that is, from the beginning of May till towards the end of September, or, in favourable feafons, the middle of October. On many of the larger dairy-farms in feveral diftricts, cheefe is frequently made throughout the year; but that made during the winter months is faid to be confiderably inferior in quality, and much longer in becoming fit for fale, or for ufe, than that which is made within the above period. In Gloucefterfhire the feafon of making thin cheefe is moftly from April to November; but the principal one for making thick is during the months of May, June, and the beginning of July. This is the bufy feafon of the dairy. If made later in the fummer, they are found not to acquire a fufficient degree of firmnefs to be marketable the enfuing fpring. But where the cows are well fed in the winter feafon, in the manner directed above, good cheefe may undoubtedly be made at that time by proper care in the management.

Times of Milking.

In regard to the fecond head, or the times of milking the cows, they are different in different cheefe-diftricts. In Chefhire they are, in the fummer feafon, at fix o'clock both morning and evening; and in winter, at daylight in the morning, and immediately before dark in the evening. But in Gloucefterfhire, Wiltfhire, Suffolk, and fome other counties, the people are frequently employed in milking by four o'clock in the morning in fummer; and the bufinefs in a dairy of forty or fifty cows is nearly completed before the period at which it commences in Chefhire. The latter would feem on many accounts the moft preferable practice; as when the cows are brought home to the farm-yard, which is the beft method, where the paftures are within a fhort diftance, they are milked unfettered, and the bufinefs is over before the heat increafes fo much as to make the cows reftlefs and unruly. The farmer himfelf, or fome careful perfon, fhould always attend the milking of the cows, for the double purpofe of feeing the work properly done, and carrying the milk in large buckets, into which it has been occafionally emptied from the pails to the dairy, to be poured through a ftrainer into coolers for the purpofe, or the cheefe-tub, preparatory to applying the rennet. In all well-managed dairies, particular attention fhould be paid to the thorough milking of the cows; as where this is omitted, the cows are not only apt to go dry, but become more liable to be difeafed; befides, it has been fhewn, that the laft part of the milk is very greatly fuperior in quality to that which is firft drawn from the bag, and confequently fhould be preferved as much as poffible.

The expeditious cooling of the milk, which in Chefhire is effected by putting it into leaden coolers, is found of much utility in retarding the procefs of fermentation in the fummer feafon, and thereby preventing the milk from turning into a ftate of acidity. But in winter it is obvioufly unneceffary. Thefe coolers are framed fo as to reft on legs in the manner of a table, the leaden ciftern being at the top, and about nine inches in depth, five feet in length, and two feet and a half in width, having a vent-hole in the bottom, to which is fitted a wooden fpiggot or plug. In fome cafes they are fufficiently large to hold a full meal's milk; in which cafes the milk ftands in them all night, and after the cream is fkimmed off in the morning, it is drawn out through the vent-hole into brafs-pans, and thus carried to the cheefe tub. But where there is only one cooler, and that infufficient to contain a meal's milk, it is the cuftom to draw it off into pans, as foon as the cooler becomes full, which is again filled as the milk is brought to the houfe; that laft brought in, being fuffered to ftand all night in the cooler. In other diftricts, when the weather is only fufficiently warm, the milk is fuppofed ready for ufe after being ftrained; but when of too high a temperature, it is left to ftand till properly cool; and in cafes where it is too cool, a proper quantity is warmed over the fire to raife the temperature: the grand bufinefs being, it is obferved, to raife or lower it, to a fuitable degree of warmth; as when it is too hot, it is liable to break up in knobs; and when too cold, it does not coagulate in a free manner.

It has indeed been fuggefted as probable that in very hot feafons the cheefe might be improved in its quality, and the difficulty of making it be leffened, by cooling down the milk

as quickly as poffible, by repeatedly drawing it off, and returning it again to the cooler or ciftern.

Quality of the Milk employed.

The ftate and qualities of the milk which is made ufe of in fome cheefe-diftricts, in making different forts of cheefe, has been noticed above. There can be little doubt but that much of the goodnefs of this article, under ordinary management, muft depend upon the quality of the milk which is employed in making it. There is, however, confiderable diverfity in the proportion of cream that is withdrawn from the milk employed in the making of cheefe, in different cafes, and efpecially according as they are *one* or *two-meal* kinds.

In the making of Chefhire cheefe, two meals milk is in common had recourfe to, even in dairies in which two cheefes are made in the day: and in the beginning and end of the feafon, three, four, and even five or fix meals milk are referved for the fame cheefe. It is fuggefted as difficult to afcertain what proportion of the cream is withheld from the milk, before it is put together; as the quantity may be varied, either through fuppofed judgment and fkill in the art, or from motives of a different kind. In the beft dairy-practice the cuftom is to take about a pint of cream, where two-meal cheefes are made, from the night's milk of twenty cows. It is, however, admitted, that with the view of making cheefe of the beft quality, the cream fhould be fuffered to remain in the milk; but it is an undecided point, whether fuch cream as has been once feparated from it, can again by any means be fo intimately combined with it, as to undergo no decompofition in the after-management of the bufinefs. At leaft there is no impropriety in endeavouring to prevent the feparation of two fubftances, which are again to be united. If a cheefe made wholly of the night's milk, on which the cream has rifen, be as rich as one made of new milk, all the other circumftances being the fame, it is a proof that milk and cream, after being feparated, may, by heating alone, become as it were new milk again The point can, however, only be decided by the teft of experiment. The practice here is, however, as will be feen, to unite the milk and cream; in which cafe the dairy-men fuppofe it differs in nothing, fo far as the making of cheefe is concerned, from new milk.

In the making of the cheefe, the milk managed in the manner directed above is carried either in the evening or morning, but more commonly the latter, to the cheefe-tub: fometimes in making two-meal cheefes, a portion of the creamed evening's milk is referved, as a half, a third, or more frequently only three or four gallons, to be ufed in this manner: after being made fcalding hot, by being placed in a brafs pan over a furnace, or in a veffel of hot water, one half of it is poured into the cheefe-tub among the cold milk, and the remainder into the pan in which the cream had been placed. Then, on the cream and hot milk being intimately blended, the whole is poured into the cheefe-tub, the contents of which have now been confiderably increafed by a great part, if not the whole, of the morning's milk warm from the cows. In this way the different meals milk conftitutes, as it were, a fluid of the fame nature, equal in quality and temperature. This fort of re-union, or *melting the cream*, as it is termed, is perhaps the beft method practifed, though it is fuppofed not fo effectual in affording cheefe of the beft quality, as that wholly by means of new milk.

But in the making of the inferior forts of cheefe, as thofe of the fkim-milk kind, when the milk has been managed as ftated above, where there is a tendency to too much acidity, inftead of placing it over the furnace to afford it that degree of heat which is fuppofed neceffary for facilitating the coagulation, after the application of the rennet as is ufual, it is the practice to put it directly into the cheefe-tub, and to pour in hot water fo as to procure the defired temperature, without the rifk of its breaking while over the fire, and thus to avoid other inconveniences.

To the milk in thefe ftates the rennet is immediately applied; but in the latter cafe a fomewhat larger proportion is required, than in cafes of the fame quantity of milk, where the whole, or a large part of the cream, is contained.

Preparation of the Rennet or Steep.

The coagulation or curdled ftate of milk is capable of being produced by the ufe of any fort of acid, but the material moft commonly employed for the purpofe, in the cheefe-dairy, is the *maw-fkin*, or ftomach of a young fucking calf, after it has undergone a fuitable preparation. In this ftate it is ufually termed *rennet* or *fleep*. Thefe fkins, on being procured from the butcher, ufually contain a curdled fort of fubftance, which, on their being opened, is removed, and with the bag carefully and repeatedly wafhed in cold water, and then replaced in its former fituation with a confiderable portion of falt, the whole being then packed in an upright pan or jar, and a very ftrong brine of falt and water poured over them. The bags or fkins are frequently left in this ftate for a whole year before they are made ufe of; but in other cafes, when they have remained fome time covered with the brine, they are taken out, and on an additional quantity of falt being applied, they are hung up in the dairy, or other convenient place, to dry, and remain in that ftate till they are made ufe of.

In the Chefhire cheefe-dairies, the following is confidered as an improved method of managing this bufinefs. The whole of the fkins for the feafon, pickled and dried in the manner above, are put into an open veffel or veffels, and three pints of pure fpring water poured in for each fkin; they are then fuffered to ftand about twenty-four hours: the fkins are then taken out, and put into other veffels, adding for each one pint of fpring water, letting them ftand twenty-four hours as before. On taking the fkins out the fecond time, they fhould be gently ftroked down with the hand into the infufion. They are now done with. The two infufions, thus prepared, are now to be mixed together, paffing the whole through a fine linen fieve, and adding a quantity of falt fomewhat more than is fufficient to faturate the water, or till a portion of it remains at the bottom of the veffel undiffolved. The day following, and during the whole fummer through, the fcum is to be taken clearly off as it is formed; and as the liquor fhould not be fuffered to remain without a portion of undiffolved falt at the bottom, it will be neceffary to make frequent additions of frefh falt, as that which is diffolved is gradually formed into cryftals on the furface, and taken off with the fcum as it rifes. In this ftate the liquor is fit for ufe. There are fome other modes of preparing rennet in ufe, but they do not differ materially from the above.

From the preparation in the firft of thefe modes being made at different times, there muft of neceffity be a great difference in the ftrength, and confequently in the effects which are produced either when made ufe of in the piece, or after being fteeped in fome liquid. There is without doubt much more certainty in refpect to the equality of ftrength where the fubftance is extracted from the whole at once.

The quantity of the firft forts of fteep which is employed is ufually about the fize of half a crown to a cheefe of fixty

fixty pounds, where it is cut from the bottom parts of the bags which are good; but when cut from other parts ten times as much is often infufficient. The cuftom commonly adopted is, to cut two pieces for each cheefe; one from the inferior or bottom, and the other from the upper part of the fkin. The cup in which the fkin is infufed, fhould daily have a good fcalding. Of the liquid preparation fomething lefs than a wine half-pint will commonly be found fufficient for a cheefe of the fame fize as the above. And conftantly, on taking any of the liquid out for ufe, the whole fhould be well ftirred up, in order that its ftrength may be more equally preferved.

In Gloucefterfhire, the proportion of rennet employed is one-third of a pint to fifty gallons of milk, which quantity is fuppofed to make three cheefes of from ten to a hundred weight, or of 33 pounds each.

Cheefe colouring.

The ufe of this fubftance has been fo long common in moft of the cheefe diftricts, that it is probable the article would be almoft wholly unfaleable without it, efpecially the beft kind. This is a practice which, probably, had its origin in the defign of affording the idea of richnefs; but it is conftantly found that the leaneft cheefe requires the largeft quantity of colouring matter, to bring it to that appearance which is defired. And the degree of colour is moftly regulated by the name under which the cheefe is intended to be fold by. The fubftance which is employed for this purpofe fhould be Spanifh *arnotto*, but is often a matter of an inferior quality. Where it is of the genuine kind, the weight of a guinea and a half is moftly fufficient for a cheefe of fixty pounds weight; but in the Gloucefterfhire dairies, they allow an ounce commonly to a hundred weight of cheefe. In preparing it for being mixed with the milk, different methods are purfued. In the Chefhire dairies, the quantity fuppofed neceffary is ufually tied up in a linen rag, and put into half a pint of warm water over night, when to be ufed in the following morning; the whole of the infufion being then blended with the milk in the tub, at the fame time that the fteep infufion is applied, dipping the rag into the milk, and rubbing it againft the palm of the hand as long as any colour can be made to come from it. But in Gloucefterfhire, it is prepared by carefully rubbing a piece of it upon a ftone kept for the purpofe, and then mixing it in a liquid ftate with the milk. The quantity is here judged of by the fhade of the colour to be produced, without any fixed rule; and it is put in previoufly to the application of the rennet. As this is an ufelefs and ridiculous practice, which adds nothing to the qualities of the cheefe, it fhould furely be fet afide.

Setting the Cheefe-Curd.

It is far from being afcertained with any degree of accuracy what the temperature of the milk fhould be, in order to be in the moft proper ftate for the application of the rennet. It is, however, generally allowed that the quantity as well as quality or texture of the curd, in fo far as toughnefs, or the contrary, is concerned, depends in a great meafure on the length of time the curd is in forming; and that again on the quantity and ftrength of the coagulation or fteep employed, the ftate of the atmofphere, and the heat of the milk, at the time of being mixed together. In this point, the practice of almoft every particular dairy differs from that of the other. In thofe of Chefhire, the *loweft* degree of heat which milk fhould have, when the rennet is applied, is fuppofed to be one-half of that of the milk from the cow; the *higheft*, about twice the natural warmth. From this it is inferred, that by the time a large dairy of cows has been milked, and the milk put together for the purpofe of artificial coagulation, the dairy manager will not commit any material error in applying the rennet immediately afterwards. This is, however, a rule which is uncertain, and open to much objection from the variation of the feafon, and the frequent great changes which take place in the ftate of the weather in the fame feafon. Confequently, in all dairies which afford cheefe of a fuperior quality, the heat of the milk is brought to the regular ftandard which has been fuggefted by experience as the moft fuitable, before the rennet is applied. It is likewife found, as the refult of experience, that the milk, produced on poor clays, requires more warming than fuch as is afforded on lands that are rich; as where this is much heated, the difficulty of the procefs is increafed. In fome Chefhire dairies they do not, however, heat a drop of the evening's milk, only diffolving the cream in a brafs pan floated in a furnace of hot water. It is fuppofed by Mr. Rudge, from fome experiments which have been made, that the proper degree of heat is about the middle between fummer and blood heat, or probably about 90° of Fahrenheit's thermometer may give the average warmth which is neceffary.

Some highly interefting and important obfervations and experiments, made with the view of afcertaining this matter, have been ftated by Mr. Marfhal in the following manner.

Next, fays he, to the art of correcting the milk (an art as yet in its infancy), that of coagulating it, feems to claim the attention of the experimentalift. It is known, from daily experience, that the warmer the milk is, when the rennet is put to it, the fooner it will coagulate, with a given quantity of rennet of a given ftrength. It is equally well known, that the cooler the milk, and the longer it is in coagulating, the more tender and delicate the curd becomes: on the contrary, if the milk be too hot, and the coagulation takes place too rapidly, the curd proves tough and harfh. But it feems to be a fact equally well eftablifhed, that a cheefe made from milk which has been coolly and flowly coagulated, is longer before it becomes marketable, than one made from milk which has undergone a lefs deliberate coagulation; and which, being drier and of a harfher texture, fooner becomes cheefey, and fit for the tafter. Therefore, the great art in this ftage of the procefs lies in the degree of warmth of the milk when fet; that is, when the rennet is put to it; or, in the degree of heat retained by the curd when it comes, that is, when the coagulation has fufficiently taken place, or, in the length of time between the fetting and coming: which length of time may regulated either by the degree of the warmth of the milk when fet; or, by the ftate of warmth in which it is kept during the time of coagulation; or, by the quantity and ftrength, taken jointly of the rennet.

In order to gain fome information on this fubject, he made the following experiments.

In 1781, June 5th, twenty-three gallons of milk, heated to ninety-fix degrees of Fahrenheit's fcale, with two tea-cupfuls of weakifh rennet, came in one hour; the curd delicate and good: 6th, the fame quantity of milk, of the fame heat, with the fame quantity of rennet, came in nearly the fame time: the curd fomewhat tough; owing, probably, to the milk having been burnt to the kettle in which it was heated: 7th, twenty-feven gallons of milk, heated to ninety-four degrees, with the fame quantity of rennet, came in about two hours; the curd very good: 8th, twenty-fix gallons of milk, heated to one hundred and two degrees, with one tea-cupful of rennet, came in two hours and a half;

half; curd very good: 9th, twenty-five gallons of milk, heated to one hundred degrees, with a tea-cupful and a half of rennet, came in about one hour and a half; the curd good, but fomewhat tough, owing, perhaps, to the milk being kept too warm in the cheefe-tub, by being covered up clofe with a thick cloth.

It is noted, that on the feventh and eighth the whey retained the heat of about eighty-eight degrees, whereas the whey this morning was ninety-two degrees: fo that, perhaps, it is not the heat when it is fet, but the heat when it comes, which gives the quality of the curd: 10th, twenty-five gallons; ninety-fix degrees; two cups; uncovered; came in two hours and a quarter; whey eighty-feven degrees; curd very tender: 11th, twenty-three gallons; one hundred degrees; more than a tea-cup; uncovered; did not come in two hours; owing to the rennet being lower in ftrength than before; therefore, added a little more rennet, which brought it in about three hours from firft fetting; the whey eighty-feven degrees; the curd uncommonly delicate: 12th, twenty-four gallons of milk; one hundred degrees; two cups of rennet; uncovered; came in two hours; whey eighty-nine degrees; curd uncommonly tender: 13th, twenty-eight gallons of milk; ninety-two degrees; three cups, (fay ftrongly renneted;) covered up with a coarfe linen cloth; came in one hour and a half; whey eighty-fix degrees; curd very good, and of a very fine colour; though perhaps would have handled tenderer if it had not ftood fome time after it came, before it was broken up. Perhaps, fays he, much depends on its being broken up in the critical minute: 14th, twenty-eight gallons; one hundred degrees; two cupfuls; uncovered; came in one hour and a quarter; whey ninety-four degrees; curd fomewhat harfh, but of a good colour. The change of colour, therefore, he thinks, owing to the change of pafture.

Here he notes, that the milk fhould be covered to make it come together; this came, and grew hard at the bottom half an hour before it was fet at the top: 15th, twenty-eight gallons; milk heated to ninety-five degrees; with two cups of rennet; and covered after it had ftood three quarters of an hour; came in one hour and a half; whey eighty-nine degrees, (the morning warm;) curd very good and tender: 16th, thirty gallons of milk heated to one hundred and three degrees, but lowered by two pails-full of cold water to ninety-fix degrees; with two cups and a half of rennet; and kept clofe covered; came in an hour; whey ninety-four degrees; curd pretty good, but not fufficiently tender: 17th, twenty-eight gallons; ninety-feven degrees; two cups and a half; covered, but not clofe; came in one hour and a half; whey not tried, curd fomewhat tough.

It is noted that the toughnefs was owing, perhaps, to fome milk of a new-calved cow being among it. But to try the exact heat of milk immediately from the cow, he immerged a difh in the pail while milking. After it had lain long enough to receive a degree of heat equal to that of the milk in the pail, emptied it, and immediately milked into it from the teat, (the cow being at the time about half milked;) the heat ninety-five degrees; and likewife, that the cheefes of yefterday (the 16th of June) prefs remarkably elaftic, and fpongy, like a fungus, perhaps owing to the milk's coming too hot; or, perhaps, to two or three of the cows being then a-bulling; or, perhaps, being made thicker than ufual, the prefs was not heavy enough for them; or, perhaps, this ill quality is owing to the cold water being put into the milk.

He afterwards found, that milk of a cow, on the day of amour, retained, after having ftood fome time in the pail after milking, ninety-eight degrees of heat. This fhews that the ftate, if not the quality of the milk, is altered by the heat of the cow; and a cautious dairy-woman always endeavours to keep fuch milk out of her cheefe-tub.

June 18th, thirty gallons; ninety-five degrees; covered; came in an hour and a half; whey ninety-two degrees; curd pretty good: 19th, thirty gallons; ninety-two degrees; two cups; covered; curd very good: 21ft, thirty gallons; ninety-eight degrees; lowered by half a pail of cold water to ninety-five degrees; the curd good; but the cheefes, like thofe of the 16th, prefs hollow and fpongy. Therefore, it is probable, from thefe two incidents, that lowering the heat of the milk with cold water has an evil effect: 23d, (evening) fifteen gallons of new milk warm from the cow, retaining a heat of ninety-two degrees; with two cups and a half of new weak rennet; and clofely covered; came in three quarters of an hour; whey eighty-eight degrees; curd very delicate and good: 25th, forty gallons of half fkim-milk, heated to eighty-feven degrees, with three cups of rennet, flightly covered, came in three quarters of an hour; whey feventy-nine degrees; curd remarkably good of this fort.

On September 8th, in obferving the effect of fome remarkably ftrong rennet, he found that an ordinary tea-cupful coagulated fufficiently upwards of forty gallons of milk, heated to only eighty-eight degrees, in thirty-five minutes.

From the whole of thefe experiments it appears, he thinks, that curd of a good quality may be obtained from milk heated from 87 to 103 degrees of Fahrenheit's thermometer, provided the rennet be fo proportioned, that the time of coagulation be from three quarters of an hour to two hours and a half; and provided the milk be kept properly covered during the procefs of coagulation. And from thefe, as well as a variety of other trials, which he made in the courfe of the fummer, it appears to him at prefent, that from 85° to 90° are the proper degrees of heat; that from one to two hours is the proper time of coagulation; and that the milk ought to be covered, fo as to lofe in the procefs about five degrees of its original heat. But, fays he, climature, feafons, the weather, and the pafture, may require that thefe bounds fhould fometimes be broken. A few obfervations, made in one feafon, and in one place, how accurately foever they may have been taken, are by no means adequate to the entire illuftration of this very abftrufe fubject.

It has been ftated as a matter of furprife, by Mr. Donaldfon, that in dairies of confiderable extent, the ufe of the thermometer is not fo well underftood as that of the *fkimming-difh*, as by correct trials in this way, in refpect to the moft fuitable temperature for milk, in order to have the rennet applied, the quality of the cheefe might be greatly improved, and the bad confequences of cracking, bliftering, and hoveing which often take place from improprieties in the making, be prevented. An inftrument termed a lactometer has likewife been invented, in the view of rendering affiftance in this way, by Mr. Dicas of Liverpool, by the ufe of which, and the thermometer, it is imagined, by the above writer, that confiderable improvement would be made in the management of the cheefe-dairy, efpecially, if at the fame time a mean could be eftablifhed for determining the ftrength and quality of the rennet, and the quantity neceffary for properly coagulating a given quantity of milk. See Lactometer.

The frothy fubftance which is apt to rife in pouring the new milk into the cheefe-tub, in confequence of the air entangled with it, fhould conftantly be fkimmed off in a careful manner, and be depofited in the cream-veffels.

As no general rule has yet been eftablifhed, whereby to determine either the quantity of rennet to be applied, or the proper

proper temperature of the milk at the period of application, it can only be ftated, that each dairy-maid is obliged to exercife her own difcretion, according to the exifting circumftances, in regulating her conduct in this refpect. But although practice is the only means by which fhe can acquire a proper knowledge of this branch of the bufinefs, yet the confequences of proper or improper conduct are well known in every cheefe-dairy. When the coagulation is accelerated or retarded beyond the proper time, which in making a 60 pound cheefe is reckoned one hour and a half, either by giving too much or too little rennet, or by applying it when the milk is too hot or too cold, not only the quantity of the curd is diminifhed, but the quality in either cafe materially affected. In the former cafe it is of a tough, gluey texture; in the latter, too tender.

After the colouring and rennet have been applied, the milk-tub is covered by a board or wooden cover, over which is laid a linen cloth; and having ftood the ufual time, which is about an hour and half, in which it is frequently examined; and where the cream rifes to the furface, before the coming takes place, as is often the cafe, the whole is to be ftirred together, fo as to well blend the milk and cream again; and this repeated as often as neceffary, till the coagulation is formed, which may fometimes be haftened by gentle ftrokes on the fides of the tub; or, where coolnefs is fufpected as the caufe of its not coming properly, heat in fome way or other may be applied for the purpofe, and cold in the contrary circumftances; and even when an additional quantity of rennet is required, it may likewife at this period be applied, that is, before the coagulation occurs; but when the dairy maid finds that the coagulation is completed, which is known by gently preffing the furface of the milk with the back of the hand, or by leaving the fkimming difh inverted in the furface of the milk, where the whey will appear on its removal, fhe fets to work with her affiftants to feparate the curd from the whey, an operation which is generally called breaking and gathering the curd.

Breaking and gathering the Curd.

Simple as this bufinefs may appear, and uniform as one would expect the method to be, there are few particulars, fays Mr. Donaldfon, in the whole art of cheefe-making, wherein fo great a difference is obfervable in practice. In fome dairies, the curd, when ftiff, is at firft broken or cut in various directions with a common cafe-knife, or cheefe-knife made for the purpofe, and ufed with a view of making the whey feparate eafily, and without carrying off with it any richnefs from the curd. After thefe firft incifions, fome time is allowed for the broken curd to fubfide. The knife is then again ufed, and more freely than before; and while the dairy-maid ftirs up the unbroken curd from the bottom with the fkimming-difh in one hand, fhe cuts the larger pieces of curd with the knife, which fhe holds in the other. This method, as well as that by the hand is continued until the whole of the curd is broken down and reduced in an uniform manner into fmall particles. This bufinefs in general occupies about forty minutes, the curd being then left covered over with a cloth for about half an hour, in order to fubfide. See CHEESE-KNIFE.

Having thus thoroughly broken the curd, and allowed fome time for its fubfiding, fhe then begins to take off the whey with the fkimming-difh. In other dairies not lefs celebrated for good cheefe, the fkimming-difh only is ufed in breaking the curd; this is particularly the cafe where the milk has been fet cool together, and the curd is of courfe more tender, the edge of it being held perpendicular to the furface of the whey in the tub, being dipped gently into it, an inch or two, and the whole curd in that way turned. The breaking is then performed in a gentle manner, moftly by the hand, more time being allowed for the purpofe.

And in order to facilitate the operation of feparating the whey from the curd, fome of the whey that firft rifes to the top is fkimmed off, and being either heated or cooled, according to the ftate of the weather, and the required confiftence of the curd, is again returned into the cheefe-tub; and after remaining a little time, the whole is laded off in the ufual manner. All the whey that can be extracted without preffure having been removed, and the cheefe-tub being raifed at one fide, the curd is collected into a mafs, and at firft preffed with the back of the fkimming difh. When no more whey can be difcharged by this means, others more violent are adopted; the curd is, in many cafes, cut with the cheefe-knife, to give vent to the whey, and is then preffed as hard as poffible with the hands; in others, a confiderable weight is frequently applied, by means of a board of a femi-circular form contrived to fit one half of the chefe tub's bottom in a loofe manner, being placed upon the curd; the parts which are forced out by the preffure being again and again cut off, and replaced under the board, and the whey preffed out, continually removed as it is formed. The whole mafs of the curd is now turned upfide down, put on the other fide of the tub, then again preffed, pared, and preffed as in the former cafe. The board and weight being removed, the curd is cut into pieces eight or nine inches fquare, which are piled upon each other, and then preffed with the board and weight, the cutting and piling being repeated till no more whey drains off from it. The curd having been in a great meafure feparated from the whey, it is put into two or three pans, or other veffels, and the dairy-maid and her affiftant break it with their hands as fine as poffible; in the courfe of doing which, a proper quantity of falt (for the weight or meafure is fcarcely in any inftance afcertained) is fcattered over the curd, and intimately mixed therewith. Sometimes the curd is divided into three portions, being broken down and falted feparately, the middle portion often confiderably the moft.

According to the method ufually practifed in Gloucefterfhire, when the curd is broken to the requifite finenefs, it is again returned into the cheefe-tub, where it is fcalded, by pouring over the broken curd a pailful of hot-water, or of whey, or of whey and water mixed. After the fcalding-water or whey is applied, the whole is brifkly ftirred, and being allowed to ftand for fome time for the curd to fettle at the bottom of the tub, the fcalding materials are fkimmed or poured off, and the curd being preffed as before, fo that no more whey can be extracted by fuch means as were formerly ufed, it is put into the vat, and preffed in the ordinary way.

Vating and preffing the Cheefe.

As foon as the curd has been properly broken down, rubbed, and falted, a cloth is fpread over the cheefe-vat, which in Scotland is called a *cheffel*, and the broken curd being packed into it fo as to be heaped up in a conical form above it, and covered up with the cloth, by being turned up at the corners, after being preffed by the hand fo as to adhere together, a board is laid over the vat, and a weight heavy in proportion to the quantity of curd, placed upon it, by which means the remaining whey is preffed out. Where the cheefes ufually made are of a large fize, as in Chefhire, the dairyman thrufts a number of iron fkewers, through holes made in the fides of the vat for the purpofe, into the curd in various directions. Thefe being withdrawn, the openings made by them ferve as fo many drains for permitting the whey to run off. In fome dairies they have recourfe to *thrufting* fcrews, which

which are fixed to the floor above, the power of which can be regulated at pleafure. In others a lever is ufed to prefs or thruft the cheefe, which is a long ftrong pole, having one end faftened in the wall, in a direction nearly parallel to the top of the cheefe, on which a board is placed for the reception of the power of the lever, which is made ufe of at difcretion. When the whey, in place of running freely, which it does at firft, only falls in drops, the weight is removed, and the curd re-broken, and, being again put into the vat, is managed in the manner juft defcribed, and repeated while, by ufing fuch means, a drop of whey can be extracted. The curd being now almoft entirely freed from the whey, it is again placed in the vat, a clean cloth having been previoufly fpread for the purpofe of receiving and inclofing it. The curd now takes the form, at leaft, of cheefe; and the cover of the vat being on, it is placed in the cheefe prefs. See CHEESE-PRESS.

It is extremely neceffary that large dairies fhould be well provided with vats of different fizes, as where three or four cheefes are made at each meal, a great number of vats become abfolutely in ufe, and where there are not at the fame time a number empty, the operator is confined in his choice, and cannot proportion exactly the vats to the fizes of the cheefes, or rather the quantity of curd in the tub, and when a little overplus curd is preferved from meal to meal, it often happens that a whole cheefe is fpoiled. The vats fhould always be fo chofen that the quantity of curd may neither over or under-fill them, when the cheefes are fully preffed.

Before the cheefe is put in the prefs, it is ufually turned in the vat, and rinfed with warm whey. The cloth now made ufe of being finer and longer than that formerly employed, and is fo placed, that on one fide it may be level with the edge of the vat, and on the other wrap over the whole furface of the cheefe, and the edges put within the vat, thus perfectly enclofing the whole cheefe in the cloth. In this ftage of the procefs the cheefe is ftill higher than the edge of the vat, but to preferve it in due form, recourfe is had to a tin-binder, or hoop, about three inches broad, which is put round the cheefe, on the outfide of the cloth, and the lower edge of the binder preffed down with the vat, fo low as that the upper edge of it may be level with the furface of the cheefe. In this ftate a fmooth board being placed over it, the prefs is gently let down upon it. There are moftly preffes of different weights; fome dairies putting them under the preffure of the heavieft, and others of the lighteft, the firft. And occafionally cheefe fillets are made ufe of inftead of the tin-binders, for which a coarfe fort of broad ftrong tape is ufed, one end of which is thruft down with a thin wooden knife between the cheefe-cloth and vat, and then drawn tightly feveral times round the cheefe, faftening it with ftrong pins As foon as the vat with the cheefe is placed in the prefs, and the weight applied, fkewers are again thruft in through the holes in the fide of the vat and binder, left for the purpofe: this is done repeatedly during the firft day the vat is in the prefs. It is performed by fkewers of ftrong iron wire, eighteen or twenty inches in length, fharp at the points, and turned with a bow at the other end. The operation of fkewering commonly continues till the morning after the cheefe has been put in the prefs, and the oftener the cheefe is fhifted in that time the better, it being generally taken out, and turned in about half an hour, the angles being pared, where thofe of the vats are not rounded off. There is, however, much difference in this refpect in different inftances, but the interval from the time the vat is firft placed in the prefs till it is again taken out, does not, in ordinary cafes, at moft exceed two or three hours. When taken out, the naked cheefe is put into a veffel with hot whey, or warm water, with the view of hardening its coat or fkin, and preventing bliftcrs, where it ftands for an hour or two; it is then taken out, wiped dry, and after having remained fome time to cool, it is covered with a clean dry cloth, and the vat being wiped dry, and the cheefe replaced, it is again put into the prefs. In the evening, fuppofing the cheefe to have been made in the morning, which is the ufual time, it is again taken out of the vat, and another dry cloth being applied, it is turned and replaced; what was formerly the upper becoming now the under-fide. At this and the former turning the upper furface is fometimes pricked, all over, an inch or two deep, to prevent bliftering. In this manner it is taken out, wrapped in clean cloths, and returned into the vat twice a day, for two days, when it is finally removed. In the two laft turnings finer cloths are made ufe of, that no marks or impreffions may be left on the cheefe.

Thefe are the methods moftly followed in the principal dairy diftricts; but other modes are in practice in other places, as well as in many inftances in thefe. It is often the cuftom to bare-vat the cheefes at the latter end of the preffing.

Salting of the Cheefe.

The falting of the cheefe is the next part of the management. The cheefe, on being for the laft time removed from the prefs, and taken out of the vat, is carried to the falting-houfe, and placed on a fine cloth in the vat, in a falting tunnel or tub filled to a confiderable depth with brine, in which it ftands for feveral days, being regularly turned once at leaft every day. But a method now more generally ufed is, to cover the upper furface of the cheefe wholly with falt, repeating the application at every turning, for about three days, and changing the cloths twice in the time. But in the firft mode, the vat is then removed from the brine-tub; and the cheefe being taken out, is placed on the falting bench, where it ftands for eight or ten days, falt being carefully rubbed over the whole every day, during that period. This is likewife the cafe in the latter method. Where the cheefe is of a large fize, it is commonly furrounded with a wooden hoop, or fillet of cloth to prevent renting. After it is fuppofed to be fufficiently falted, it is wafhed in warm water or whey, and, when well dried with a cloth, is placed on what is called the drying bench, where it remains a like period before it is removed to the keeping houfe or chamber. In other dairies, the new cheefes are not put in brine, but kept in the vats on the falting benches; and after being rubbed with falt, and turned in the vats daily for a week or ten days, the vats are removed, and the cheefes managed in the manner above-mentioned. In feveral other dairies, again, the cheefes are falted while the operation of preffing is performing. At every time they are taken out of the prefs, for the purpofe of being turned in the vats, they are well rubbed with falt, which for fmall thin cheefes, fuch as are commonly made in Wiltfhire and Gloucefterfhire, is found to be fufficient; and therefore when taken for the laft time from the prefs, in place of any more falt being applied, they are fet at once upon the drying benches.

The practice of immerging new made cheefes in brine is now principally adopted where they are of fo large a fize that rubbing falt on the outfide would not be fufficient for anfwering the intended purpofe of preferving them, &c.

It is found that in Chefhire twenty eight pounds or half a bufhel of falt in the week, is fufficient on the average through the fummer for dairies where fixty pounds cheefes are made, including the domeftic confumption in families of moderate fizes. And that the greateft quantity of falt ufed for one fixty pounds cheefe is about three pounds; but what the actual quantity is which is retained in the cheefe, has not been afcertained.

Neceffary

Neceſſary Management in the Cheeſe Room.

The laſt part of the buſineſs of cheeſe-making is the management in the cheeſe-room. When the cheeſes are properly ſalted, and have acquired a competent degree of dryneſs, they are carried from the ſalting place to the cheeſe-room, or ſtore-houſe; where, after being ſmeared with freſh butter, or ſweet whey butter, they are laid on the floor, or on ſhelves erected for the purpoſe. For the firſt ten days, or a fortnight after they are placed in the ſtore-room, they are pretty ſmartly rubbed all over every day, and the ſmearing with butter repeated; however afterwards, a round ſpace, of four or five inches diameter on each ſide, in the middle is left unrubbed; but although after that period it may be only neceſſary to rub them two or three times in the courſe of the week, they ſhould be daily turned, as long as they are kept; the uſual practice is to rub them three times in the week in ſummer, and twice in the winter ſeaſon. And the ſcraping of the rind ſhould be rendered unneceſſary by frequent cleanings. Where the room is warm the coat will eaſily be prevented from riſing.

In Cheſhire the cheeſe-rooms are moſtly placed over the cow-houſes, in order to derive that moderate and neceſſary degree of temperature, which is ſuppoſed *eſſential* to the ripening of cheeſe, from the cattle below. In ſome caſes the floors are rubbed with different green vegetables, as bean-tops, &c., in others dry ſubſtances are uſed; but in Cheſhire, dried coarſe graſs or ruſhes, termed *ſniddle*, is uſed as a litter for the floors, and ſometimes wheat ſtraw, but which is objectionable, from its knots making impreſſions on the cheeſes. And Rouen hay is adviſed as a proper material for the purpoſe.

It may be proper, before we come to introduce ſome miſcellaneous remarks on a few circumſtances in reſpect to cheeſe, to deſcribe the methods of making ſome other kinds of cheeſe.

Method of making Parmeſan Cheeſe.

The mode which is uſually adopted, according to Mr. Price, as ſtated on the authority of ſignior Vitabni, is to put, at ten o'clock in the morning, five *brints* and a half of milk, each brint containing about forty-eight quarts, into a large copper, which turns on a crane, over a ſlow wood-fire, made about two feet below the ſurface of the ground; the milk is ſtirred from time to time; and about eleven o'clock, when juſt lukewarm, or conſiderably under a blood-heat, a ball of rennet, as big as a large walnut, is ſqueezed through a cloth into the milk, which is kept ſtirring. By the help of the crane, the copper is turned from over the fire and let ſtand till a few minutes paſt twelve; at which time the rennet has ſufficiently operated. It is now ſtirred up and left to ſtand a ſhort time. Part of the whey is then taken out, and the copper again turned over a fire ſufficiently briſk to give a ſtrongiſh heat, but below that of boiling. A quarter of an ounce of ſaffron is now put in to give it a little colour, and it is well ſtirred from time to time. The dairy-man frequently feels the curd. When the ſmall, and, as it were, the granulated parts, feel rather firm, which is in about an hour and an half, the copper is taken from the fire, and the curd left to fall to the bottom. Part of the whey is taken out, and the curd brought up in a coarſe cloth hanging together in a tough ſtate. It is then put into a hoop, and about half a hundred weight laid upon it for about an hour; the cloth being then taken off, and the cheeſe placed on a ſhelf in the ſame hoop. At the end of two or from that to three days, it is ſprinkled all over with ſalt; the ſame is repeated every ſecond day, for about forty or forty-five days, after which no further attention is required. While ſalting they generally place two cheeſes one upon another in which ſtate they are ſaid to take the ſalt better than ſingly.

Method of making Stilton Cheeſe.

The proceſs for making this highly valuable ſort of cheeſe is thus ſtated in the Report on Agriculture for Leiceſterſhire: the night's cream is put into the morning's new milk, with the rennet, when the curd is properly come, it is not broken, as is the caſe in the making of other cheeſe, but is taken out with the ſoil-diſh altogether, and placed in a ſieve to drain gradually; and as it drains kept gradually preſſed, till it becomes firm and dry; being then placed in a wooden hoop, and afterwards kept dry on boards, frequently turned, having cloth binders paſſed round it, which are tightened occaſionally as found neceſſary.

Method of making Green Cheeſe.

In the making of a cheeſe of this ſort of about ten or twelve pounds weight, an infuſion made by ſteeping about two handfuls of ſage, and one of marigold leaves, with a little parſley, after being bruiſed, one night in a proper quantity of milk. In the morning the greened milk is ſtrained off, and mixed with about one-third of the whole quantity to be run. The green and the white milks are then *run* ſeparately, keeping the two curds diſtinct, until they are ready for vatting. The mixing of them depends on the fancy of the maker. In ſome caſes the two are connected together, blending them in an even and intimate manner; in others, the green curd is broken down into irregular fragments, or cut out in irregular figures by means of proper tins. In the operation of vatting, the fragments or figures are placed on the outſides. The bottom of the vat is firſt ſet with them, crumbling the white or yellow curd among them. As the vat fills, others are placed at the edges, and the remainder buried fluſh with the top. In the management afterwards, the ſame plan is purſued as thoſe which have been deſcribed for common cheeſe.

Miſcellaneous Circumſtances in the Management of Cheeſe.

The *cracks*, which ſo frequently take place in cheeſe, have been aſcribed to various cauſes; as, lime being employed as a manure, expoſure to a current of air after being taken out of the preſs, eſpecially before they have ſweated in the cheeſe-room. Some of theſe cauſes are, however, extremely doubtful.

The *rankneſs* and *pungency* of cheeſe are commonly attributed to the impurity of the ſteep, to neglect in waſhing out and ſcalding the ſteep cup daily, and to the want of ſalt: but ſome ſuppoſe it, with greater reaſon, to be owing to the imperfect ſeparation of the curds and whey. Heaving and running out at the ſides, as well as ſpungy, eyey, and whey ſpringy cheeſe, are all aſcribed to the ſame cauſe.

The *heaving* of cheeſe is moſt generally ſuppoſed to depend upon the ſweating or fermentation not being perfectly performed. Some, however, ſuppoſe it to depend on the rankneſs of the paſtures; the improper temperature of the cheeſe-room, and various other cauſes, as may be ſeen in the Report on Agriculture for Glouceſterſhire.

The *bliſters* of cheeſe are likewiſe ſuppoſed to proceed from the ſame cauſes. The uſual remedy is opening them, and pouring hot water into the inciſions; then preſſing down the outer rind, putting a little ſalt upon it, with a piece of ſlate and a half pound weight.

The *running out at the ſides*, is ſuppoſed to ariſe from the ſame cauſes as heaving; or the want of due preſſing: the uſual

ufual remedy is that of binding it tightly round with a cheefe fillet.

The ufual remedies of *fpongy, eyey,* and *whey fpringy* cheefe are careful breaking, good thrufting, frequent fkewering, and a powerful application of the prefs.

In cafes where milk is converted into cheefe, the produce which is afforded by the cows is ftated in very different ways, in different diftricts where this fort of practice is purfued. In fome $2\frac{1}{2}$ *cwt.* from each cow, whether good or bad milkers, is fuppofed a very good average annual return. In others it is ftated to be three hundred weight, and from that to three and an half, and even four. Mr. Rudge, indeed, ftates it to rife in the Gloucefterfhire dairies fo high as from three hundred and a half to four hundred and a half weight in the feafon.

On the general fuppofition of farmers, that a cow requires the produce of from two and a half to three acres and a half of land for her fupport the year round, the average quantity of cheefe by the acre may be ftated as fomething more than one hundred and eighteen pounds. But all thefe forts of ftatements are very uncertain, from the great differences of circumftances.

The following ftatement is given by Mr. Rudge, as the profit on a dairy of twenty cows in Gloucefterfhire :

Debtor.	£.	*s.*	*d.*
Rent of forty acres of land for pafture	60	0	0
—— of twenty acres for hay	30	0	0
Making hay at 12*s.* per acre	12	0	0
Carrying and ricking	3	0	0
Tythe at 2*s.* 6*d.* per pound	11	5	0
Poor and highway rates, at 3*s.*	13	10	0
Two women to milk, at 3*s.* per week	7	16	0
Dairy-woman, at 4*s.* 6*d.* per week	11	14	0
Labourer in winter to fodder	4	10	0
Wear and tear of dairy utenfils	3	0	0
Salt	3	0	0
Arnotto, at 7*s.* per *lb.*	1	15	0
Intereft of money laid out in ftock and implements (reckoning each cow at 20*l.*), and chance of lofs	40	0	0
Profit	136	10	0
	338	0	0

Creditor.	£.	*s.*	*d.*	
Cheefe, 4 tons, at 4 *cwt.* each cow, and 3*l.* 3*s.* per *cwt.*	252	0	0	
Value of Whey	40	0	0	
Pafture for colts and fheep	10	0	0	
Profit of calves	21	0	0	
—— of butter	15	0	0	
				338 0 0

It is however here fuggefted, that the dairy farmer is probably charged with expences higher than he really incurs, from the work being differently performed, and the fervants being often engaged in other forts of work; and likewife from the whey being charged at the felling price, and not at that of its value as a food for fwine.

Much of the profit of well-managed dairies may arife from the hogs. It is ftated by Mr. Rudge, that from eight to ten hogs, of nine or ten fcore each, are ufually kept to twenty cows. But where hogs are not kept, the whey is valued and fold at two pounds per annum. See SWINE.

DAIS, in *Botany*, (Δαις, a folemn feaft; perhaps from the profufion and beauty of the flowers; which profeffor David Van Royen, who founded and named this genus, held in great eftimation, and confidered as the pride of his garden at Leyden, in 1786.) Linn. Gen. 215. Schreb. 292. Willd. Sp. Pl. v. 2. 579. Juff. 77. Gært. t. 39. Clafs and order, *decandria monogynia.* Nat. Ord. *Veprecula*, Linn. *Thymelææ*, Juff.

Gen. Ch. *Cal.* Involucrum of four leaves, containing many feffile flowers; its leaves fcariofe, erect. Perianth none. *Cor.* of one petal; funnel-fhaped, longer than the involucrum; tube thread-fhaped, rude; border in five (fometimes but four) deep, lanceolate, obtufe fegments. *Stam.* Filaments ten (fometimes but eight), inferted into the tube, fhorter than the limb, alternately longer and fhorter; anthers fimple. *Pift.* Germen oblong-ovate, fuperior, clofely invefted by the bafe of the petal; ftyle thread-fhaped, as long as the tube; ftigma globofe, curved upward. *Peric.* Berry ovate, of one cell, leathery. Seed folitary.

Eff. Ch. Involucrum of four leaves. Corolla in four or five fegments. Berry dry, with one feed.

Dais *cotinifolia*, Curt. Mag. t. 147.; the original and moft interefting fpecies, is a fhrub, fix or eight feet high, much branched. *Leaves* deciduous, oppofite, on fhortifh ftalks, obovate, entire, fmooth, opaque, pale, and fomewhat glaucous. *Flowers* terminal, of a delicate lilac hue, externally filky, forming elegant tufts at the end of each branch. It is a native of the Cape of Good Hope, from whence the Dutch received it long before it was known in England. It thrives with us in the ground of a confervatory, better than in a pot, and is propagated only by feeds obtained from abroad. D. *octandra* (D. *laurifolia*, Jacq. Ic. Rar. t. 77), grows in the Eaft Indies, and has larger leaves, of a deeper green, and fmooth flowers, whofe fegments are occafionally five or four, with ten or eight ftamens. A third fpecies, D. *difperma*, found by Forfter in Tongatabu, varies likewife in the number of the parts of its flowers.

DAIS, in *Gardening*, comprehends a plant of the fhrubby, deciduous, ornamental kind; the D. *cotinifolia*, cotinus-leaved dais; in which the leaves are oppofite, the flowers in a bunch aggregate, terminating and pubefcent, and the fruit a fmall nut of an ovate-acuminate form. It is a native of the Cape.

Method of Culture.—This is a plant which is capable of being raifed by fowing the feed, which may be had from Holland, in pots of light earth, in the fpring feafon, and plunging them in a good hot-bed: as foon as the plants have acquired a fufficient growth, they muft be removed into feparate pots of a proper fize, and be placed under the protection of the green-houfe. It is likewife a plant which occafionally fucceeds by layers and cuttings, if made from the young fhoots. The great difficulty of raifing it, however, renders it a fcarce plant in our green-houfes.

DAISY, in *Botany*. See BELLIS *perennis;* alfo CHRYSANTHEMUM, ASTER, and GLOBULARIA. The name is derived from day and eye, alluding to the eye-like form of the flower, and its expanfion in the day, and in bright weather only, when it prefents its front to the fun, following his courfe till the afternoon, when the flower clofes, but opens again for many fucceffive mornings.

DAIX, in *Ancient Geography*, a river of Scythia, on this fide of mount Imaus. It fprang from mount Noruffus, and difcharged itfelf into the Jaxartes.

DAKER HEN, in *Ornithology*, one of the fynonyms of the rail. See RALLUS *crex*.

DAKIR, in our ftatutes, is ufed for the twentieth part of a laft of hides.

According to the ftatute of 51 Hen. III. "De compofitione ponderum & menfurarum," a laft of hides confifts of twenty dakirs, and every dakir of ten hides. But by 1 Jac. cap.

cap. 33. one laſt of hides or ſkins is twelve dozen. See Dicker.

DAL, or Dahl, *Dal elbe*, *Dal elfwe*, *Dal ålf*, *(the river of the valley)*, in *Geography*, the largeſt and fineſt river of Sweden, riſes in the mountains which ſeparate Sweden from Norway, and conſiſts originally of two ſtreams, which, after having watered the whole province of Dalecarlia, unite in the pariſh of Gagneſs. That branch which waters the eaſtern part of Dalecarlia is called the Oeſter Dal Elfwe, and that which runs through the weſtern part Weſter Dal Elfwe.

After a courſe of about 260 miles, the Dal falls into the Gulph of Bothnia, near Elfkarleby, about ten miles to the eaſt of Geſle. It flows in a broad and tranquil ſtream, until it reaches a ridge of rocks, and a high iſland a quarter of a mile in circumference, where the whole river forms a cataract ſcarcely inferior to that of the Rhine at Schafhauſen. The iſland divides the cataract into two principal falls, of which the eaſtern is the fineſt. The breadth of the river is about a quarter of a mile, and the perpendicular height of the fall between thirty and forty feet. Coxe's Travels, vol. v.

Dal, the ablative caſe of the Italian article; as *dal* or *del ſig. Paeſiello*, by ſignor Paeſiello; *Dal l'Inferno di Dante*, from Dante's Inferno.

DALA, in *Geography*, a river of Switzerland, which from the canton of Berne flows into the republic of the Vallais, paſſing by the baths of Leuk, and running afterwards through an abyſs ſo deep and ſo obſcure, that, notwithſtandſtanding the violence and noiſe of its current, the river is neither ſeen nor heard. Coxe's Switzerland.

Dala *Syſſel*, or *Dale Syſſel*, commonly called *Breyda ſiardar daler*, from the bay of Breydafiardur, is, according to Buſching, the moſt delightful, or rather the only pleaſant, tract of country in Iceland. The mountains run in two parallel lines, and the valleys between are watered by a number of little brooks and rivulets.

DALABORG, or Dalebourg, a ſmall and formerly fortified town of Sweden, in the ſouthern part of the province of Dalecarlia, on the weſt ſide of the lake Wener, 50 miles N. of Gothenburg.

DALAI. See Coulon.

DALATIS, in *Ancient Geography*, a country of Aſia, in Cilicia, mentioned by Ptolemy.

DALBERGIA, in *Botany*, (named by Linnæus in honour of two brothers of the name of Dalberg, to whom he was indebted for many Surinam plants.) Linn. Suppl. 53. Schreb. 483. Willd. Sp. Pl. v. 3. 900. Juſſ. 362. (Ecaſtaphyllum, Browne Jam. 299. t. 32. f. 1.) Claſs and order, *diadelphia decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* of one leaf, bell-ſhaped, with five bluntiſh teeth. *Cor.* papilionaceous; ſtandard large, aſcending, ovate inclining to heart-ſhaped, notched, with a linear claw; wings oblong, ſtraight, obtuſe, with a recurved tooth at their upper edges; keel ſcarcely ſhorter than the wings, ſtraight, obtuſe, cloven at the baſe. *Stam.* Filaments two, each in four or five ſegments, in ſome inſtances accompanied by a third ſmall ſimple filament; anthers eight or nine, ſcarcely more, globoſe, two-lobed. *Piſt.* Germen ſtalked, compreſſed, oblong, ſtraight, ſmooth; ſtyle aſcending or reflexed, deciduous; ſtigma capitate. *Peric.* Legume ſtalked, thin, flat, cartilaginous, ovate or oblong, cloſe, not burſting, containing one or more ſeeds. *Seeds* compreſſed, ſomewhat kidney-ſhaped.

Eſſ. Ch. Stamens in two equal ſets. Legume ſtalked, coriaceous, compreſſed, not burſting.

Two ſpecies only of this genus are deſcribed. D. *lanceolaria*, Linn. Suppl. 316. (Noel-valli, Rheede Hort. Mal. v. 6. 39. t. 22.) A native of Malabar and Ceylon, from whence Konig ſent it to Linnæus. It is a tree with long, wand-like branches, clothed with ſoft whitiſh hairs. *Leaves* alternate, pinnate, with numerous, alternate, elliptical, waved, entire leaflets, hairy above. Flowers in axillary hairy bunches. Legume lanceolate, acute, about two inches long, with one ſeed, rarely two, imbedded in its middle part.

D. *monetaria*, Linn. Suppl. 317. is found in wet ſituations in Surinam. The leaves are ternate. Legume orbicular, deciduous, harder than in the former. The wood of this tree or ſhrub is red, and yields a reſin reſembling what is called Dragon's-blood.

DALBY, in *Geography*, a ſmall town of Sweden, in the province of Schonen, or Scania, where Suen king of Denmark built, in the year 1065, a convent, in which two kings are buried: but in 1512 this convent was ſequeſtered to the crown by Chriſtian III. of Denmark, to whom Scania was then ſubject.

DALDÆ, in *Ancient Geography*, an epiſcopal town of Aſia Minor, in Lydia.

DALE, Samuel, M.D.; in *Biography*, but who applied himſelf more to the ſtudy of botany than to the practice of medicine, was born in the year 1659. He firſt ſettled as an apothecary, at Braintree, in Eſſex; but in 1730 he became a licentiate of the college of phyſicians, in London, in which capacity he practiſed medicine at Bocking, where he continued to reſide to the time of his death, which happened in 1739. He was alſo elected a fellow of the royal ſociety. In 1693 he publiſhed "Pharmacologia ſeu manuductio ad materiem medicam," 8vo. London, which has paſſed through many editions. The author lived long enough to publiſh an edition of his work in 4to, in 1737, much enlarged and improved, which has alſo been frequently reprinted. In this he has diſpoſed of the plants in the manner adopted by Ray. In the firſt part of the work the author deſcribes and gives an account of the properties and manner of uſing the plants moſt eſteemed in medicine. In the latter part, in a ſupplement, plants leſs known and uſed, with ſome that had been very lately diſcovered in America, and other foreign countries, are deſcribed. He alſo publiſhed in 1732, in 4to, "Silas Taylor's Hiſtory and Antiquities of Harwich and Dover Court," to which he made conſiderable additions. In this he diſplays an accurate knowledge in the ſeveral branches of natural hiſtory, giving an exact account of the figured foſſils of the cliff, and an intelligent ſynopſis of the animals and vegetables of the neighbouring ſea and coaſt. Gen. Biog.

Dale, in *Geography*, a river of Ireland, flowing from a ſmall lake of the ſame name in the county of Donegal, which runs into the Foyle, a little below Lifford. This river is navigable for boats from the Foyle to the village of Ballindraite.

DALEA, in *Botany*, (after Samuel Dale, a botaniſt of the time of Ray, author of the Pharmacologia.) Linn. Hort. Cliff. 363. Juſſ. 355. Willd. Sp. Pl. v. 3. 1336. (Pſoralea, Linn. Gen. 386. Schreb. 508.) Claſs and order, *diadelphia decandria*, ſect. 1. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* of one leaf, dotted with prominent glands, five-cleft; ſegments awl-ſhaped, permanent. *Cor.* Papilionaceous; ſtandard roundiſh, erect, notched; wings ſmall, obtuſe, united to the filaments, as is alſo the keel, which conſiſts of two obtuſe petals. *Stam.* Filaments five or ten, united into one ſet; anthers roundiſh. *Piſt.* Germen oblong; ſtyle awl-ſhaped, as long as the ſtamens; ſtigma

 ſimple.

fimple. *Peric.* Legume enclofed in the calyx, of one cell. *Seed* folitary, kidney-fhaped.

Eff. Ch. Wings and keel united to the ftamens, which are monadelphous. Legume of one feed.

Linnæus, after having eftablifhed this genus in his earlier works, referred it fubfequently to *Pforalea*, but Juffieu and Willdenow have juftly reftored it. The monadelphous filaments, united to the wings and keel, afford a fufficient character. Juffieu thought all the fpecies were pentandrous; but Willdenow finds only five that are fo, nine being decandrous, in all fourteen. His *Dalea cliffortiana*, Linn. Hort. Cliff. t. 22. (Pforalea Dalea, Linn. Sp. Pl. 1076), is a rare South-American fpecies. Several are found in North America, of which Michaux has made his genus *Petaloftemum;* others in Mexico, figured in Cavanilles' *Icones.* The leaves of all are pinnate, with a terminal leaflet, and glandular beneath. Flowers for the moft part of a dull blueifh hue, in denfe hairy fpikes. Habit more or lefs fhrubby.

DALECARLIA, Daland or Thalland, in Latin *Dalia*, and in Swedifh *Dal* or *Dalarna*, in *Geography*, a province of Sweden in the weftern part of Gothland, between the Wener lake and the government of Gothenburg, derives its name from the great number of vallies which it contains. It is ten Swedifh miles long, and five and a half broad.

This country is richly diverfified with an alternate fucceffion of forefts, rocks, hills and dales, uplands and plains, paftures and arable land, lakes and rivers; and the beauty of the landfcapes is particularly heightened by the river Dal. Sillian, its principal lake, is feven Swedifh miles in length, but not above a quarter of a mile in breadth.

Dalecarlia is fubdivided into the north and fouth part. The former is rocky and mountainous; its chief place is Amal, and its higheft mountain the Borekne. The fouth part is a champain country, and has no town but Dalaborg. Towards the fouth it produces corn; but its chief articles are cattle, fifh, butter, and cheefe. It has a number of mines.

The inhabitants, who are called Dalecarlians, are famous in hiftory for their integrity and firm attachment to their king and country, and for their courage and bravery. They firft fupported Guftavus Vafa, and enabled him to attempt thofe efforts which ended in the expulfion of Chriftian the Second, and in the eftablifhment of the houfe of Vafa on the Swedifh throne. Guftavus III., who prided himfelf on his defcent from Guftavus Vafa, ordered a wet nurfe for the prefent king of Sweden, his fon, to be chofen among the women of Dalecarlia; and in the dangers which threatened Sweden, in 1788, the Dalecarlians were foremoft in offering their fervices for the defence of their country. The Dalecarlians ftill retain the manner of living, drefs, and cuftoms, of the ancient Swedes.

Dalecarlia may be called the claffical ground of Sweden, being full of memorials which indicate the veneration of the natives for the memory of Guftavus Vafa.

The four principal villages of Dalecarlia are Leckfand, Mora, Rättwik and Tuna. Each of thefe four parifhes has from 7 to 11,000 inhabitants, and the vicarage of any of thefe, particularly of Leckfand, is more defirable than many a Swedifh bifhopric in point of revenue.

In the midft of the valley irrigated by the Dal, is a rock called *Buller Klac*, fcarcely forty feet high, from the fummit of which the naked eye difcovers 35 villages, crowded with an immenfe population.

The language of the Dalecarlians differs fomewhat from the Swedifh, and it has been afferted that it is a kin to the Icelandic. Profeffor Enbergius fays: "Dalica et Iflandica per omnia adeo funt fimiles, ut, quando Iflandica accentu Dalico legitur, omnes Dalecarlicam effe judicent; id quod experimento certior factus." Ihre maintains that it was proved at Upfal in 1692, when divine fervice was read to the Dalecarlians affembled there, in the Icelandic language. Some learned Englifhmen are of opinion, that the Dalecarlian language is a dialect of the Celtic, like the language of Lower Britanny, Wales, and Ireland; and bifhop Ruden affures us, that a Swedifh ambaffador brought with him to England a Dalecarlian boy, who could converfe with the Highlanders. There is indeed fome fimilarity between the Dalecarlian and the Scotch Highland dialect. (Promenade d'un François en Suede par de la Tocnaye, 1801. Coxe's Travels, vol. v.)

On the breaking out of the war, which has lately been declared by Ruffia and Denmark againft Sweden, the Dalecarlians have once more diftinguifhed themfelves by the moft ardent attachment to their king and country. The regiment of Dalecarlia formed the van-guard of the army under general Armfeldt, deftined againft Norway, and in the latter end of March, 1808, penetrated fifty Englifh miles into the enemy's country without meeting with any obftacle.

DALECHAMP, James, in *Biography*, a learned French phyfician and indefatigable botanift, was born at Caen in 1513, ftudied medicine and botany at Montpelier, was admitted doctor in medicine in 1547, and died at Lyons, where he had long practifed phyfic, in 1588. He publifhed feveral elaborate tranflations, particularly of the 15 books of Athenæus into Latin, in 1552, in 2 vols. folio, illuftrated with notes and figures; and fome of the works of Galen and Paul Egineta into French. In 1556 he publifhed a tranflation of "Cœlius Aurelianus de Morbis acutis;" and in 1569, "Chirurgie Francoife, avec plufieurs figures d'inftrumens," 8vo., which has been feveral times reprinted. He principally followed the practice of Parée, from whofe work he borrowed the figures of the inftruments; but he has added a tranflation into French of the feventh book of Paræus, with annotations, and fome curious cafes occurring in his own practice. He was alfo the editor of an edition of Pliny with notes, publifhed in 1587. His firft work, according to Haller, was an 8vo. edition of Ruellius's Commentary on Diofcorides, which appeared at Lyons in 1552, enriched by Dalechamp with 30 fmall figures of plants, at that time but little known. His principal performance was an univerfal hiftory of plants, in Latin, with above two thoufand five hundred wooden cuts, befides repetitions, publifhed after his death in 2 folio volumes. The publifher, William Rouillé, feems to take upon himfelf the chief credit of collecting and arranging the materials of this great work, though he allows that Dalechamp laid its firft foundations. Haller fays, the latter was engaged in it for 30 years; his aim being to collect together all the botanical knowledge of his predeceffors, and enrich it with his own difcoveries. He employed John Bauhin, then a young man, and refident at Lyons, to affift him; but Bauhin being obliged, on account of his religion, to leave France for Switzerland, like many other good and great men of that and the following century, the work in queftion was undertaken by Des Moulins, and foon afterwards Dalechamp died. It is often quoted by the title of "Hiftoria Lugdunenfis," and hence the merits of its original projector are overlooked, as well as the faults arifing from its mode of compilation, which are in many inftances fo great as to render it ufelefs. The fame figure is occafionally repeated for very different plants, an accident too common in books with wooden cuts; and the letter-prefs

ter-prefs is an affemblage of learning, criticifm, and conjecture, which adepts only can turn to any certain profit. Many of the figures, however, are original and good, efpecially among the graffes, and fome of the umbelliferæ. The author had a fingular fancy of enriching, or rather encumbering his cuts with figures of infects, which have no reference to the plants, and do not exactly refemble any living thing. He feems to have been infpired with the fame tafte as a certain countryman of his, who fays "Statues are the foul of a garden," and to whom, therefore, Eden itfelf, without fquirting gods and goddeffes, would have been dull and infipid. Sometimes Dalechamp gives us feparate bloffoms, fruits, or leaves; but they feem intended merely for decoration, and never teach any thing more than may be feen in the principal figure. How different from the cuts executed under the direction of Conrad Gefner! Throughout the work there are fcarcely any traces of methodical arangement, much lefs of difcriminating or affociating plants by their flowers or fruits. The ftyle, indeed, is altogether defultory. A French tranflation was publifhed in 1615, and again in 1653. Haller's Bibl. Bot. Nouv. Dict. Hiftorique. Dalech. Hift. Pl. S.

DALECHAMPIA, in *Botany*, (named by Plumier after Dalechamp, the French botanift.) Linn. Gen. 501. Schreb. 653. Willd. Sp. Pl. v. 4. 515. Juff. 392. Plum. Gen. t. 38. Clafs and order, *monoecia monadelphia*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juff.

Gen. Ch. Barren flowers feveral, enfolded by a pair of bracteas. *Cal.* Involucrum common, in 4 deep fegments, which are erect, obtufe, one of them, under the nectary, twice as large as the reft; Perianth of 6 ovate reflexed leaves. *Cor.* Petals none; nectary broad, of numerous, obovate, flat leaves, in feveral rows. *Stam.* Filaments numerous, united into a tube as long as the calyx; anthers roundifh, with four furrows.

Fertile flowers three, between the fame bracteas. *Cal.* Involucrum common, of three leaves, which are upright, roundifh, permanent, the outermoft thrice broader than the reft; perianth of 10 lanceolate, ferrated, clofed, permanent leaves. *Cor.* none. *Pift.* Germen roundifh, with 3 furrows, fhorter than the calyx; ftyle thread-fhaped, very long, bent towards the barren flowers; ftigma fomewhat peltate. *Peric.* Capfule three-lobed, roundifh, of 3 cells and 3 valves. *Seeds* folitary, globular. Jacq.

Eff. Ch. Barren flowers, Invol. in 4 deep fegments; Perianth of fix leaves. Cor. none. Fertile, Invol. of 3 leaves; Perianth of 10. Cor. none. Capf. three-lobed.

D. *fcandens*, the original fpecies, Jacq. Amer. 252. t. 160, Plum. Amer. t. 101, a native of Martinico and Hifpaniola, is chiefly known by the defcriptions and figures of Jacquin and Plumier. It has a rough climbing ftem, with tendrils; three-lobed, ferrated, hairy leaves; and axillary green flowers on long ftalks. The bracteas are large, deeply three-cleft, ferrated, enclofing the flowers and feeds. D. *colorata*, found by Mutis in New Granada, has entire leaves and purplifh bracteas. La Marck, in his Encyclopedie, defcribed nine more fpecies, eight of them from South America, one from China. None of thefe plants are at prefent known in the gardens of Europe. Their flowers are deftitute of beauty.

DALEHR, in *Geography*, a fortrefs of Sweden, built on a rocky ifland, with a garrifon to guard the entrance and receive the duties of veffels going to Stockholm.

DALEM, a town of Germany, in the circle of Weftphalia, and bifhopric of Paderborn; feven miles E. of Buren.

DALEM, fee DALHEM.

D'ALEMBERT, in *Biography*, fee ALEMBERT. This eminent mathematician and philofopher would certainly merit a diftinct article among mufical writers, for the clear and geometric arrangement and explanation of the diffufed and obfcure theoretical writings of Rameau, if, in the article *Baffe Fondamentale*, we had not already incidentally examined his mufical opinions, before and after his controverfy with the celebrated French opera compofer and writer on the fubject of mufic, in the two editions of his "Elements of Mufic, according to the Principles of Rameau."

The fyftem of Rameau, founded on the *Baffe fondamentale*, was rendered fo clear, pleafing, and fafhionable, by the firft edition of d'Alembert's Synopfis, as to be as implicitly believed in France, as Burnet's Theory of the Earth was in England, till examined by Keil, and proved to be founded on unphilofophical principles. But a few years after, when d'Alembert had more accurately examined the principles of Rameau, and expreffed his doubts of fome of them in an article of the Encylopedie, Rameau was fo irritated as to publifh a pamphlet in his defence, in which he feems to have loft all refpect for his commentator; after which d'Alembert openly attacked his fyftem, and denied its being capable of demonftration, which ftaggered the lift of French contra-puntifts, who had thought there never was, nor ever could be, any accurate and good mufic compofed, but on the principles of the *Baffe fondamentale* of M. Rameau; which at prefent is as much neglected and forgotten in France, as, in the houfes of the great, fmoking is in England.

DALEN, CORNEILLE VAN, called the Younger, a defigner and engraver, the fon of a print-feller of Antwerp, where he was born about the year 1626. He was placed under the tuition of Cornelius Viffcher, whofe ftyle he generally adopted, though he fometimes feems to have imitated the manner of Vorfterman, P. Pontius, Bolfwert, and other artifts. Dalen acquired confiderable reputation, and is faid by Fufeli to have travelled into England; but this, probably, is only fuppofition, arifing from his having engraved the portraits of feveral Englifhmen. The prints of this artift are finely executed, and evince a correct tafte, and his heads in particular are in high eftimation. He fometimes marked his plates C. D. not unfrequently adding junior. Amongft his numerous performances are the following: The four Fathers of the Church, a middling-fized, upright plate, from Rubens; the Graces embellifhing a Statue of Nature, a large print, on two plates, from the fame, much in the manner of Bolfwert; the Virgin prefenting the Breaft to the Infant Chrift, middling fized, from Flinck; Venus and Cupid, middling fized, from the fame; Charles II. in armour, a half-fheet print, much efteemed; four prodigioufly fine portraits from Titian, generally confidered the *chefs d'œuvres* of Van Dalen: 1ft, Pietro Aretino, holding a book half open; 2d, Gio. Boccacio, holding a book fhut; 3d, Giorgione da Caftelfranco, feen in front; 4th, Sebaftiano del Piombo. This latter is by fome attributed to Tintoretto. Huber.

DALENS, DIRK, a painter, born at Amfterdam in 1659. He was inftructed by his father, William Dalens, a landfcape-painter of no eminence. At the age of 13 he became acquainted, at Hamburgh, with John Voorhout, in whofe company he applied himfelf to the pencil with unabated affiduity. He afterwards returned to Amfterdam, where he enjoyed confiderable reputation during the remains of his fhort life, which terminated at the age of 29, in 1688. A fine landfcape, with ducks and other fowl, painted by this artift, after the manner of Hondekoeter, is in the collection of the Elector Palatine. Defcamps.

DALENAS, or DALENES, in *Geography*, a fmall town of Norway, in the diocefe of Drontheim, with a provoftfhip, to which belong ten parifhes, and twenty-nine churches.

DALENBURG,

DALENBURG, a town of Germany, in the circle of Lower Saxony, and principality of Luneburgh Zell, on the Netze; 16 miles E. S. E. of Zell.

DALENE, a ſmall town of Norway, in the dioceſe of Chriſtianſand, with a provoſtſhip of five pariſhes.

DALFFEN, or DALFEN, a town of Holland, in the Overyſſel, ſeated on the Vecht; 8 leagues S. W. of Coverden.

DALFHEIM, a town of Germany, in the circle of the Lower Rhine, and palatinate of the Rhine; 6 miles N. W. of Worms.

DALHEIM, a town of Germany, in the circle of Weſtphalia, and duchy of Juliers; 3 miles N. N. W. of Waſſenberg.

DALHEM, or DALEM, a ſmall town of France, in the department of the Ourte, chief place of a canton, in the diſtrict of Liege, on the river Bervine; 6 miles N. E. of Liege, and 18 N. W. of Limbourg, with which it was annexed to France, in conſequence of the wars of the Revolution, having formerly belonged to the United Provinces of the Netherlands, at preſent the kingdom of Holland. Dalhem has 732 inhabitants, and its canton 19 communes, with a population of 13,622 individuals, upon a territorial extent of $62\frac{1}{2}$ kiliometres. N. lat. 50° 45′. E. long. 8°.

DALIAS, a town of Spain, in the province of Grenada; 6 leagues W.S.W. of Almeria.

DALIN, OLOF VON, in *Biography*, a Swediſh hiſtorian and poet, was born in 1708 at Winberga, in Holland, where his father was clergyman. He was educated at Lund, and in 1735 he publiſhed, without his name, a weekly paper, entitled "the Swediſh Argus." This was ſo much eſteemed, that the author was appointed librarian at Stockholm in 1737; and from thenceforth he acquired great reputation by his literary productions, which obtained a very general circulation through the whole kingdom. In 1739 he began his travels, and in the courſe of the next four years viſited the principal places on the continent, and formed an acquaintance with many men of great learning and celebrity. In 1743 he publiſhed a poem, entitled "Swediſh Liberty," one of the beſt poetical productions that ever appeared in Sweden. He was next engaged to compile a hiſtory of his own country from the earlieſt period to the preſent time, which he accompliſhed in three volumes quarto; and which was afterwards tranſlated into the German language. In 1749 the hereditary prince was put under his care; the duties of preceptor he performed ſo much to the ſatisfaction of his employers, that he was ennobled in the year 1751, when he aſſumed the name of Von Dalin. In 1753 he was appointed a counſellor of the chancery, and in two years after hiſtoriographer to the king. He was next advanced to the dignity of knight of the polar ſtar, and counſellor of the court. This happened in the ſpring of 1763, and in the following Auguſt he died at the palace of Drothngholm. He was a voluminous but very reſpectable writer, and his ſmaller pieces have been collected and printed in 6 volumes. General Biography.

DALIS, DALIA, or DALAND, in *Geography*. See DALECARLIA.

DALISANDUS, in *Ancient Geography*, a town of Aſia, in Cappadocia. Ptolemy.

DALKEITH, in *Geography*, a conſiderable town, though a ſmall pariſh, in the county of Mid-Lothian, Scotland, is delightfully ſituated on a ſtrip of land, between the rivers North and South Eſk; whoſe banks are richly clothed with trees, and ornamented with handſome ſeats of ſome families of diſtinction. *Dalkeith-houſe*, adjoining the village, the elegant ſeat of the duke of Buccleugh, was erected on the ſite of Dalkeith Caſtle, about the beginning of the laſt century. The thriving and luxuriant plantations around it, enlivened by the waters of two winding rivers, which unite about half a mile below, over one of which is thrown an elegant ſtone bridge, and the various walks laid out with much taſte, tend greatly to heighten the effect of the building. The park is well wooded, and ſtocked with deer. This place is much reſorted to by perſons from Edinburgh, and other parts of Scotland adjacent, for the purpoſe of being gratified with the ſurrounding and delicious ſcenery. A few manufactures have been lately introduced, but the principal trade is in corn; for which article one of the largeſt markets in the country is held here every Thurſday: the whole buſineſs of which is done for ready money. The grammar ſchool of Dalkeith has long been in high repute as an excellent ſeminary; and in this ſome of the brighteſt ornaments of literature Scotland has produced firſt received the rudiments of their education. The population of the pariſh in 1799, amounted to 4336, about 3000 of which reſided in the town. But this has ſince much increaſed.

DALKEY, a ſmall iſland in the Iriſh ſea, forming the ſouthern limit of the bay of Dublin. It contains about 18 acres, having plenty of herbage. The channel between this iſland and the main land is called *Dalkey Sound*, in which there is good anchorage for ſhips. The village of Dalkey, on the main land, is romantically ſituated at the northern baſe of a high mountain, commanding a beautiful view of the bay of Dublin. This village in the reign of queen Elizabeth, and during a great part of the 17th century, before the port of Dublin was improved, was the repoſitory of the goods belonging to the merchants of Dublin. Dalkey iſland is in long. 6° 4′ W. Lat. 43° 19′ N.

DALLAMANO, GUISEPPE, in *Biography*, a painter, born at Reggio, in 1679. This artiſt, though totally illiterate, and by ſome even ſaid to have been an idiot, poſſeſſed extraordinary talents for painting, and was eſpecially an excellent colouriſt. He lived many years in the ſervice of the court of Turin, and died in 1758. Lanzi.

DALLANS, RALPH, an organ-builder of conſiderable merit, and great practice in England, at the time of the Reſtoration. During the ſuppreſſion of the cathedral ſervice, and prohibition of the liturgy, ſcarce a tolerable inſtrument had been left entire in any church of the whole kingdom. Some of them had been ſold to private perſons, ſome robbed of their pipes for the ſake of the metal, and others totally deſtroyed by malignant fanatics. Except Dallans, Looſemore of Exeter, Thamar of Peterborough, and Preſton of York, there was not an organ-builder to be found in England. Theſe were employed with all the workmen that could be procured, in repairing the organs of ſome churches, and conſtructing new ones for others. Dallans was engaged to build a new organ for St. George's chapel, Windſor; which, perhaps, from the haſte with which it was conſtructed, though its appearance was beautiful and magnificent, did not prove ſo excellent as was expected. He alſo erected, among a great variety of others for different places, the organ at New College, Oxford; and an upright organ, with four ſtops, for the public muſic ſchool in that univerſity, eſtabliſhed ſoon after the reſtoration. The price of this laſt inſtrument was only fifty-one pounds ten ſhillings; as appears from a printed account of inſtruments, books, and other neceſſaries, bought for the uſe of the muſic-ſchool with money contributed for that inſtitution.

The time of Dallan's deceaſe was nearly aſcertained by an inſcription on a ſtone in the Old Church of Greenwich, which is thus recorded by Strype:

"Ralph Dallans, organ-maker, deceaſed while he was making this organ; begun by him February 1672. James White, his partner, finiſhed it, and erected this ſtone 1673."

DALLER,

DALLER, or Dahler, in *Geography*, a ſmall town of Denmark, in that part of Slefwick which is conſidered as belonging to North Jutland, in the peninſula of Jutland.

DALL-JOSEPHAT, a dale, in Southern Africa, which, together with Waagenmaker's valley, is encloſed between the hilly projections that branch out towards the north or upper end of the valley of Drakenſtein. The beſt oranges, as well as the beſt peaches, and other fruit, are ſaid to be produced in theſe dales; and the wines are among the firſt in quality.

DALLOWICZE, a town of Lithuania, in the palatinate of Minſk; 32 miles N.E. of Minſk.

DALMACHERRY, a town of Hindooſtan, in the Myſore country; 100 miles N.E. of Bangalore, and about the ſame diſtance N W of Madras. On the ſituation of Dalmacherry and Gooty, depends the whole courſe of the river Pennar from its ſource to Cuddapa; together with all its branches, and the different poſitions near them. Concerning the poſition of Dalmacherry, ſays major Rennell, there is a diverſity of opinion, its bearing and diſtance not having been mathematically aſcertained. This accurate geographer places it $56\frac{1}{2}$ geographical miles from Arcot, in a N N W. direction; which makes the interval between it and Cudapanatum, $46\frac{1}{2}$; and its latitude is 13° 43′ 30″. There are three important paſſes that lead from this place into the Myſore and Cuddapah countries; and here it was that Doaſt Aliy, the nabob of Arcot, was ſurpriſed and defeated by the Mahrattas, in the year 1740.

DALMANUTHA, in *Ancient Geography*, a place of Paleſtine, on the other ſide of Jordan, on the coaſt of the ſea of Galilee.

DALMASIO, Lippo, in *Biography*, a painter who was native of Bologna, and flouriſhed in the 14th century. He ſtudied under Vitale, and, on account of the beautiful expreſſion which he gave to his heads of the Virgin, was called by his maſter *Lippo delle Madonne*, which name he afterwards preſerved. Pope Gregory XIII. ſo highly valued one of Lippo's Madonnas, that he always kept it near his bed-ſide as an incitement to devotion; and Guido Reni could not conceive how the artiſt could give to theſe heads ſo much majeſty, holineſs, and ſweetneſs of expreſſion, without divine inſpiration. He painted many works in the different churches and palaces of Bologna. In 1408, at an advanced age, he was ſaid to have taken the Carmelite habit. Later authors, however, have diſcovered that he died in the connubial ſtate about the year 1410. Malvaſia. Lanzi.

DALMATÆ, in *Ancient Geography*, a people reckoned by Strabo among the Illyrian nations, and who gave their name to a part of Illyria, which they occupied.

DALMATIA, an extenſive country of Europe, towards the Adriatic ſea, which anciently formed a part of Illyria. It was ſeparated towards the north from Liburnia by the river Titius, and on the ſouth-eaſt it had Naro. According to ancient tradition, it abounded with gold. Martial, in one of his epigrams, called it the land which produced gold. The principal rivers were the Titius, which watered the towns of Burnum and Sardona; the Tilurus, which paſſed near a hill on which was ſeated the town of Equum; and the large river Naro. Its chief towns were Scardona, Arbuda, Burnum, Promona, Tragarium, Sicum, Salones, Aſpalathos, Andetrium, Equum, Epetium, Cnæum, Peguntium, Bataneum, Narona, and Delminium. When the Avari obtained poſſeſſion of this country, it was afterwards denominated by the Chriſtians *Pagania*, becauſe the Avari were idolaters: the Illyrians called it Poganin. Pogania was divided into three diſtricts or zupanies. Mocros, formerly called Bataneum, was the moſt conſiderable town.

Dalmatia, or *Delmatia*, in *Geography*, from its ancient capital *Delmium* or *Delminium*, which the Romans took and deſtroyed in the 597th year of Rome, is a country of Europe between the 42d and 46th degree of north latitude; bounded on the north by Boſnia and Croatia, on the eaſt by Servia and Turkey in Europe, and on the weſt and ſouth by the Adriatic ſea, or gulf of Venice. It is 336 miles long, and 69 miles broad. In the year 1783, the number of its inhabitants was ſuppoſed to be 367,000. It was at that time divided between four different powers; one part belonged to Auſtria, and was ſtyled Hungarian Dalmatia; another belonged to the Italian republic of Venice, and has ſince paſſed under the ſovereignty of Auſtria, along with the Venetian ſtates, but is at preſent in the hands of the French; the third part belonged to the little republic of Raguſa, which part, together with Raguſa itſelf, is likewiſe occupied by French troops; and the fourth belonged to the Ottoman Porte, and was called Turkiſh Dalmatia.

Hungarian Dalmatia lies in the upper part of the Adriatic ſea, and compriſes, beſides the country of the Uſcocks and Morlachia, the diſtrict of Zengh, on the confines of Iſtria, the diſtrict of Ottoſchatz, the county of Lyka or Licca, part of which belongs to Turkey; the weſtern part of the county of Corbau; and the Zwonigrod or Serman diſtrict. Zengh or Segna, and Ottorſchatz, are its principal towns.

Venetian Dalmatia was divided into the continent, and the county of Zara. Its inhabitants are conſidered as ſkilful mariners; at leaſt, they are the beſt in the Adriatic. They reſemble the Slavonians in their manners, and ſpeak the ſame language. The country is mountainous and rather barren. The principal towns, are ſituated on the coaſt. Zara is the capital.

Raguſan Dalmatia, which belonged to the republic of Raguſa, conſiſted only of that city and a territory of about ſixty miles in length, with the towns of Gravoſa and Stagno, and five ſmall iſlands, the principal of which is Melida, Milet or Melada. See Ragusa.

Turkiſh Dalmatia is ſituated between Boſnia, and Venetian and Raguſan Dalmatia. It extends from Boſnia to Albania. Its chief places are Moſtar or Maſter, Clinovo or Klinova, and Scardona or Skardin.

Dalmatia, after it had been reduced under the Roman yoke, ſhook it off not leſs than five times, and for the ſpace of 220 years gave the Romans much trouble, until the reign of Auguſtus, when, the provinces being divided between him and the ſenate, Dalmatia fell to the latter; but the ſenate voluntarily ceded this province to the emperor, who appointed a quæſtor over it. At the death of Conſtantine the Great, Dalmatia was conſidered as a part of Illyricum. It ſuffered very much from the inroads of the northern barbarians, and was forced to ſubmit to the Goths; but it was reconquered, along with Italy, by the emperor Juſtinian. The Slavi or Slavonians, at laſt, eſtabliſhed themſelves in Dalmatia about the end of Heraclius's reign. The country had then its particular kings, the laſt of whom dying without iſſue, left his kingdom to his conſort, who bequeathed it to her brother Ladiſlaus, king of Hungary. In the fifteenth century, the Venetians conquered the whole kingdom of Dalmatia, and reſtored only a portion of it to the Hungarians, keeping the beſt maritime parts. The Turks afterwards diſpoſſeſſed the Venetians of ſome provinces, and a ſmall maritime territory was allotted to the republic of Raguſa.

The

The Dalmatians ufe the Slavonian language and cuftoms; and profefs the Roman Catholic religion. Its rivers, which have no long courfe, are moftly navigable. The country is interfperfed with mountains; but thefe are not unfruitful, as they produce olives, vines, myrtles, and a great variety of vegetables; and within them, it is faid, there are mines of gold and filver ore. The air is pure and temperate.

Dalmatia being now the fcene of bloody contefts, its fate will perhaps be decided before we arrive at the article *Montenegrins*, which will give us an opportunity to refume this account. See MONTENEGRINS.

DALMATIAN ISLES, *the*, are feveral iflands in the Adriatic, on the coaft of Venetian Dalmatia, which formerly belonged to Venice, the principal of which are Ofero, Cherfo, Veglia, Arbe, Pago, Lantano, Pafma, Ifola longa, Mortero, Brazza, Lefina, Liffa, Curzola nigra, or Corcyra. Many of thefe ifles are fertile in wine, olives, figs, and other fruits.

DALMATIAN *Chain*, is a vaft chain of mountains which proceeds by the north of Dalmatia towards the Hæmus, and is known by many local appellations, as mount Promina, near Gnin, mount Prologh, mount Clobu. The latter mountains are chiefly calcareous. Pinkerton's Geography, vol. i. p. 388.

DALMATIC, an ancient clerical habit, fo called, becaufe it was previoufly the ordinary drefs of the inhabitants of Dalmatia. It covered the whole body, and had large loofe fleeves; on which account it was thought to be convenient for the miniftry of the deacons. But it was alfo worn by bifhops, as we learn from the acts of St. Cyprian, the celebrated doctor and martyr of the third century, who being about to fuffer death, delivered his dalmatic to his deacon, leaving the reft of his drefs for the executioners. At prefent it forms part of the under-drefs of Roman Catholic bifhops, when they officiate pontifically, being made of thin, light filk. But it is the outfide and diftinctive veftment of their deacons, being richly ornamented with lace, and having a fort of large open wings attached to it, by way of fleeves.

DALRYMPLE, SIR DAVID, in *Biography*, a lawyer and hiftorian of fome eminence in Scotland, was born in 1726. He was educated at Eton, where he made a rapid progrefs in the learned languages, and formed a predilection for Englifh manners and cuftoms. From Eton he went to Utrecht, where he ftudied the civil law, and remained till the year 1746. He was called to the bar, in his own country, in 1748; but as an advocate he was far from fhining, though he poffeffed much and found learning, and was capable of arguing any cafe very forcibly. He was appointed one of the judges of the court of feffion early in the year 1776, and foon after, one of the lords commiffioners of jufticiary; on this occafion he affumed the title of Lord Hailes, the name by which he is generally known among the learned of Europe. He diftinguifhed himfelf in this fituation by ftrict integrity, patient attention, and uniform decorum of behaviour. In doubtful cafes he always inclined to mercy, and he was free from that bias towards the crown with which many of the judges in the Scotch courts have often been charged. As a public man, his character has been given in few words: he was a found lawyer, and an upright judge. In private life, he was eminent as a profound and accurate fcholar; deeply read in the claffics, and well acquainted with every department of the belles lettres, and with hiftorical antiquities, particularly of his own country. Lord Hailes publifhed many works, but thofe which chiefly demand our notice, are, 1. "Annals of Scotland, from the Acceffion of Malcolm Canmore, to the Acceffion of the Houfe of Stuart," in 2 vols. 4to. This work is fo well authenticated by references to hiftorians of good credit, or to deeds and writings of undoubted authority, that it will long remain a lafting monument of the induftry, learning, and integrity of the worthy author. 2. Lord Hailes came forward, in conjunction with the prefent bifhop of Landaff and others, to repel Mr. Gibbon's attack on Chriftianity. He publifhed a volume, entitled "An Inquiry into the Secondary Caufes which Mr. Gibbon has affigned for the rapid Progrefs of Chriftianity," in which there is a great difplay of literary and critical acumen, and of zeal for the caufe of religion, without any of the rancour too often mixed with theological controverfy. This was publifhed in 1786, and was the laft work of confequence that he fent to the prefs. The infirmities of age came now rapidly on his lordfhip; he neverthelefs was enabled to attend his duty on the bench till within three days of his death, which happened on the 29th of November 1792. Lord Hailes was author of many pieces connected with his profeffion, as a lawyer; of fome biographical fketches of the natives of Scotland; and of effays in many of our periodical works. Encyc. Brit.

DALRYMPLE'S *Point*, in *Geography*, a cape of the ifland of Dominica; 2 miles S. of Charlotte's town.

DALTON, JOHN, in *Biography*, an eminent divine of the church of England, was fon of the Rev. John Dalton, rector of Dean, near Whitehaven, where he was born, in the year 1709. He was educated at Queen's college, Oxford, and became tutor to lord Beauchamp. During this period, he adapted Milton's Mafk of Comus to the ftage, by the infertion of feveral fongs and different paffages felected from Milton's other works, as well as of feveral additions of his own, fuited to the characters and to the manner of the original author. This was favourably received by the public, and Mr. Dalton very induftrioufly fought out a grand-daughter of the poet, who was borne down with age and poverty; and procured her a benefit from it, the profits of which amounted to a confiderable fum. He went abroad with his pupil, who died in the courfe of his travels. On his return, Mr. Dalton took orders, and obtained the rectory of St. Mary Hill, London. He was afterwards promoted by the king to a prebend of Worcefter, where he died, July, 1763. He was author of a volume of fermons; of a defcriptive poem, addreffed to two ladies on their return from viewing the coal-mines; and remarks on twelve hiftorical defigns of Raphael; and the Mufæum Græcum et Egyptiacum. His brother Richard was librarian to the king, and publifhed drawings, executed by himfelf, of the proceffion to Mecca.

DALTON, in *Geography*, a fmall market town of England, in the county of Lancafter, and that part of it called *Furnefs*. It probably received its name from the Saxons: the term, in their language, fignifying a place fituated in a *dale* or *valley*. Thus, in the midft of a moft fertile tract of country, it originally derived its hiftoric confequence, from its being connected with Furnefs abbey. By a privilege granted to the abbot by king Stephen, Dalton became the capital of Furnefs, flourifhed under its aufpices, and held that rank till the diffolution of its monaftery. Subfequent to that period, it began to decline. Ulverfton, in the vicinity, being more advantageoufly fituated for trade, foon obtained the preference in a commercial view. Dalton confifts of one principal ftreet, opening into the market-place; and fome of the old houfes having been lately replaced by better buildings, its appearance has been much improved.

The

The church is a ſmall neat building, having an organ, the expence of which was defrayed by voluntary ſubſcription. The tenure of property in this place is peculiar. The place is divided into four portions, or townſhips, and the cuſtomary tenements in each are of equal ſize; pay equal parts of rent to the lord; are not deviſeable by will; and cannot be ſeparated by the proprictor. This peculiarity aroſe out of the feudal ſyſtem, variouſly modified in religious caſes; as every tenant formerly was obliged to furniſh the abbot with a man and horſe for the ſervice of the king.

The only trade of any conſequence, at preſent, is that of making malt. It has a weekly market on Saturdays, and three annual fairs. The moſt ancient is held October 23d, another on June 6th, and a third on April 28th. According to the reports ſent to government, the population of "Dalton in Furnace" is ſtated to be 303, occupying 56 houſes; and that of "Dalton," a hamlet, 1052 perſons, occupying 224 houſes. In this town, at a place called the *Beckſide*, was born, December 15th, 1734, George Romney, a painter of great genius, who obtained conſiderable eminence in his profeſſion: he died, and was interred at this his native place, Nov. 15th, 1802. On an eminence, called *High Haume*, about a mile to the north of the town, is a circular intrenched mound, which appears to have been a fortified beacon: and on the weſt ſide is a rocky eminence, with a ſquare tower upon the ſummit, probably built to guard the approach to the abbey. In this fortreſs the abbots held their ſecular courts, and immured their priſoners. The building contains three floors, and is uſed to hold the courts-leet and baron of the chief lords of the liberty and manor of Furneſs. Theſe are lord Beaulieu and the duke of Buccleugh. Near Dalton, at the diſtance of one mile and a half, are the ruins of the once extenſive and celebrated monaſtery of Furneſs. It was a Ciſtertian abbey, and, in point of wealth and magnificence, was conſidered the ſecond in the kingdom; being inferior to none, either in liberal endowment or extent of privilege, except that of Fountains, in the county of York. The majeſtic ruins of this once proud pile, from the deep retirement of the ſituation, the venerable grandeur of its fine-pointed arches, and the luxuriant trees, which caſt a gloom of ſhade in uniſon with its fallen grandeur, render it a highly picturesque intereſting ſcene, which is much frequented and admired by the votaries of taſte and lovers of antiquity.

Dalton, a fine townſhip of America, in Berkſhire county, and ſtate of Maſſachuſetts, having Pittsfield on the Weſt, and containing 859 inhabitants. It was incorporated in 1784, and lies 135 miles W. by N. from Boſton, and about 36 miles in the ſame courſe from Northampton, the ſtage road from Boſton to Albany.—Alſo, a townſhip in Grafton county, N. Hampſhire, firſt called Apthorpe, incorporated in 1784, and containing 62 inhabitants; ſituate on the eaſt bank of Connecticut river, oppoſite to Concord, in Eſſex county, Vermont.

DALUA, or Awin Dalua, *i. e. The Double Stream*, ſo called from its two ſources, a river of Ireland, which, riſing in the N.W. corner of the county of Cork near Kerry, paſſes the town of Newmarket, and meets the Allo at Kanturk.

DALUS, in *Antiquity*, a certain meaſure of land; whence comes *dali*. The *dali prati* have been eſteemed ſuch narrow ſlips of paſture, as are left between the ploughed furrows in arable land; which, in ſome parts of England, are called *doles*. The word is applied in Welſh to low meadows by a river ſide. This ſeems alſo to be the original and nature of Deal in Kent, where Cæſar landed and fought the Britons. Cowel.

DAM, a boundary or confinement, as to dam up, or dam out: *infra dominum ſuum*, within the bounds or limits of his own property or juriſdiction. Bract. lib. ii. cap. 37.

Dam denotes a bank of earth or other matter, which pens up water, as a mill-dam; ſometimes the ſheet, or pound of Wates itſelf, is called the *dam*. See Embankment.

Dam, a money of account in the Mogul empire, which is the fortieth part of a rupee, or 2*s*. 6*d*. ſterling, and ſerves for computing the land revenues.

Dam, or *Appinge Dam, Damme, Dammona*, in *Geography*, a ſmall town of Holland, in the department of Groeningen, on the river Fivel, which, from this place, is called the Damſter Diep, about three miles from the ſea, 15 N E. of Groeningen, and 18 S.W. of Embden. N. lat. 53° 36'.—Alſo, a ſmall town of France, in the department of the Lys, not far from the ſea, and 5 miles N.E. of Bruges. N. lat. 51° 14'.

DAMA, a town of Arabia, in the country of Yemen; 220 miles N.N.E. of Mecca.

Dama, in *Zoology*. See Cervus, Antelope and Nanguer, Lucanus, and Phalæna *noctua*.

DA'MA, in *Ship Building*, a reſinous ſubſtance uſed in India for paying the bottoms of ſhips. In ſome parts of that country, the planks are rabbeted into each other, the interſtices are filled with cotton, and the whole of the ſhip's bottom being payed with dáma, preſents, as it were, one impenetrable ſurface, as impervious to the water as it is poſſible for any ſubſtance, in the ſlighteſt degree porous, ſhould be.

DAMAC, in *Geography*, a town of the iſland of Java, on the north coaſt, where the Dutch have a factory.

DAMAGE, in *Law*, is generally taken for any hurt, or hindrance that a man receives in his eſtate; but more particularly for a part of what the jurors are to inquire of and bring in, in paſſing verdict for the plaintiff, in a civil action, be it perſonal or real. After verdict given of the principal cauſe, they are aſked their conſciences touching coſts and damages, which contain the hindrances that the plaintiff or demandant hath ſuffered by means of the wrong done him by the defendant or tenant. Damage has two ſignifications; the one proper and general, the other ſtrict and relative. *Proper*, as it is in caſes where damages are founded on the ſtatute of 2 Hen. IV. cap. 1, and 8 Hen. VI. cap. 9, where coſts are included within the word damages. Damage then, in its proper ſignification, is ſaid *à demendo*, when, by diminution, a thing becomes worſe; and in this ſenſe coſts of ſuit are damages to the plaintiff, as by them his ſubſtance is diminiſhed.

Relative is when the plaintiff declares the wrong done him to the damage of ſuch a ſum. This is to be taken relatively, for the wrong which paſſed before the writ brought; and is aſſeſſed by reaſon of the treſpaſs aforeſaid; and cannot extend to coſts of ſuit, which are future and of another nature. 10 Rep. 116, 117. See Costs.

In *perſonal* and *mixed* actions, damages were recovered at common law. But in *real* actions, no damages were recoverable, becauſe none were demanded by the count or writ: whereas, in actions *perſonal* the plaintiff counts *ad damnum* for the injury, and if he recovers no damages, he hath no coſts. (10 Rep. 111. 117.) In a *perſonal* action, the plaintiff ſhall recover damages only for the tort done *before* the action brought; and therein he counts for his damages. In a *real* action, he recovers his damages pending the writ, and therefore never counts for his damages. (10 Rep. 117.) By the ſtatute of Glouc. 6 Ed. I. c. 1. damages are given in real actions, aſſiſes of novel diſſeiſin, mort d'anceſtor, &c., and ſhall be recovered againſt the alienee of a diſſeiſor, as well

as againſt the diſſeiſor himſelf; and the demandant ſhall have of the tenant likewiſe coſts of ſuit; but not expences for trouble and loſs of time. (2 Inſt. 288.) See alſo the ſaid ſtatute (6 Ed. I. c. 1. 3 Hen. VII. c. 10. 2 Inſt. 284. 286. 2 Danv. Abr. 448.) Damages ſhall be recovered in writ of admeaſurement of dower; but not in a writ of admeaſurement of paſture. (2 Danv. 457.) Damages and coſts are due in a writ of annuity; and if the jury find for the plaintiff, and do not aſſeſs damages, it will be error; though he may after verdict releaſe the damages, and take judgment for the annuity. (11 Rep. 56. Dyer, 320. 369.) In battery, impriſonment, and taking of goods, againſt three perſons; one commits the battery, another the impriſonment, and the third takes the goods, all at one time, all are guilty of the whole, and to be charged in damages. 3 Lev. 324. 10 Rep. 66. 69.

In *real* actions, damages are aſſeſſed by writ of inquiry; and when the jury find the iſſue for the plaintiff, they are to aſſeſs the damages. And in actions upon the caſe, &c. where damages are uncertain, it is left to the jury to inquire of them. In debt, when it appears certain to the court what it is, the damages aſſeſſed by the jury are very ſmall, or, in fact, only nominal, as one ſhilling; and the maſter in B. R. taxeth the coſts, which are added thereto, and called damages. (1 Lill. 390.) When judgment is given by default, in action of debt, the court is to aſſeſs the damages, and not the jury: thus alſo, in judgment by *nil dicit*, in action of debt. In caſe of exceſſive damages being given, the court hath ſometimes relieved the defendant by a new writ of inquiry. (2 Danv. 464.) And in caſe of exceſſive damages, on motion, the defendant may have a new trial. (1 Nelſ. Abr. 587.) A jury may, and now frequently do, give intereſt on book-debts, in the name of damages. (Doug. 676.) In action upon the caſe, the jury may find leſs damages than the plaintiff lays in his declaration, but ought not to find more: the plaintiff may releaſe part of the damages, upon entering up his judgment. (10 Rep. 115.) Double, treble damages, &c. are allowed in ſeveral caſes, by a great variety of ſtatutes; as for not ſetting forth tythes; diſtreſſes wrongfully taken; reſcous; though, if it be not found by the jury, that the plaintiff hath ſuſtained ſome damage, in caſes where treble damages, &c. are inflicted by law, no damages can be awarded. 2 Danv. Abr. 449.

DAMAGE-*clear*, *Damna Clericorum*, was a fee aſſeſſed out of all damages exceeding five marks, and recovered to the amount of the tenth part in the court of common pleas, and the twentieth part in the courts of king's bench and exchequer, which the plaintiff was obliged to pay as a gratuity to the prothonotaries and his clerks, for drawing ſpecial writs and pleadings; but is aboliſhed by ſtat. 17 Car. II. cap. 6: and if any officer in the king's courts take any money in the name of damage-clear, or any thing in lieu of it, he ſhall forfeit treble the value.

DAMAGE-*feaſant*, or *faiſant*, is when a ſtranger's beaſts are doing hurt, or ſpoiling the graſs, corn, woods, &c. of another man, without his leave or licence.

In this caſe, the party whom they damage may diſtrain, and impound them, both by night, and by day; though in other caſes, as for rent, ſervices, &c. none may diſtrain in the night. (Stat. 51 Hen. III. ſtat. 4. 1 Inſt. 142.) If a man take my cattle and put them into the land of another, the tenant of the land may take theſe cattle damage-feaſant, though I, who am the owner, was not privy to the cattle's being there damage-feaſant; and he may keep them againſt me till ſatisfaction of the damages. (2 Danv. Abr. 364.) But if one comes to diſtrain damage-feaſant, and to ſeize the cattle, and the owner drives them out before they are taken, he cannot diſtrain them damage-feaſant, but is put to his action of treſpaſs; for the cattle ought to be actually upon the land damage-feaſant, at the time of the diſtreſs. (1 Inſt. 161. 9 Rep. 22.) Beaſts of huſbandry, ſheep, horſes joined to a cart, and, as it is ſaid, a horſe with a rider on it, may be diſtrained damage-feaſant, though not for rent. (1 Sid. 422. 440.) But the owner may tender amends, before the cattle are impounded; and then the detainer is unlawful: alſo, if, when impounded, the pound-door is open, the owner may take them out. (5 Rep. 76.) If men are rowing up my water, and endeavouring with nets to catch fiſh in my *ſeveral* piſcary, I may take their oars and nets, and detain them as damage-feaſant, to ſtop their further fiſhing; though I cannot cut their nets. Cro. Car. 228.

DAMALN, in *Geography*, a town of European Turkey, in the Morea; 40 miles S.E. of Napoli di Romania.

DAMAN of *Iſrael*, in *Zoology*. See DIPUS.

DAMANHOUR, or DEMENHUR, in *Geography*, a town of Egypt, ſituated near the canal of Alexandria, and the capital of the province of Bahira; 32 miles E.S.E. of Alexandria. This town is large, but ill-built, moſt of the houſes being conſtructed of earth or bad brick. It is the reſidence of the bey, or governor of Bahira, and of a kiaſchef, or particular commandant, and alſo of a garriſon of janizaries; and it is the centre of the trade of the cotton that is gathered in the extenſive and beautiful plains by which it is ſurrounded. It is there picked from the buſhes, beaten, carded, and ſpun; and in theſe different operations conſiſts the chief employment of the greater part of the inhabitants. This town is infeſted by a number of courteſans, who practiſe various arts of ſeduction, and who contribute to deprave the manners of the people, notwithſtanding the agricultural and commercial occupations in which they are employed. This town, which is inhabited by Copts and Mahometans, is the Hermopolis parva of Ptolemy, and is called Damanhour from the deſart. The neighbouring country produces a great deal of flax, corn, and barley, as well as cotton.

DAMANIA, in *Ancient Geography*, a town of Spain, between Lobetum to the weſt, and Edeta to the ſouth-eaſt; ſeated near the left bank of the river Turia.

DAMAPETTA, in *Geography*, a town of Hindooſtan, in the country of Golconda; 45 miles N.W. of Rajamundry, and 140 E. of Hydrabad.

DAMAR, a town of Arabia, in the highlands of Yemen, ſeated on a fertile plain between Jerim and Sana. It is the capital of a province, and is governed by a dola, who reſides in a large caſtle. It has a famous univerſity or college for the Zeidites, commonly containing 500 ſtudents. Damar has no walls; its buildings are good; and it is very large, the number of houſes being about 5000. The Jews live in a detached village; but the Banians are allowed to live in the town among the Muſſulmans. Near Damar is a mountain containing a mine of native ſulphur; and in another hill, ſomewhat further diſtant, are found thoſe fine cornelians which are ſo much eſteemed in Arabia.—Alſo, a town of of Arabia, in the province of Oman, 70 miles N. of Oman.

DAMARAS, the inhabitants of a diſtrict in the colony of the Cape of Good Hope, whoſe country is ſo barren and ſandy that they cannot keep cattle.

DAMASAN, or DAMAZAN, a ſmall town of France, in the department of Lot and Garonne, chief place of a canton in the diſtrict of Marmande, 18 miles W. of Agen. It contains 979 and the canton 7213 inhabitants, in 11 communes, and upon a territorial extent of $172\frac{1}{2}$ kiliometres.

DAMASCENA,

DAMASCENA, in *Ancient Geography,* a country of Afia, in Cœle-Syria, deriving its name from Damafcus, which is fituated in this country.

DAMASCENUS, John, in *Biography*, a learned Chriftian father in the eighth century, was born at Damafcus. His father, though a Chriftian, was alfo counfellor of ftate to the caliph of the Saracens. He was educated by a monk at Jerufalem, who had been redeemed by his father from flavery, and under whofe inftructions he made great progrefs in mathematical and philofophical learning. He fucceeded his father in the caliph's court; but his religious zeal rendered him obnoxious to the emperor, whofe fervice he was obliged to quit. From the fplendour of a court he retired to a monaftery, determining to devote himfelf to ftudy, and the feverity of the cloifter. He was ordained a prieft towards the latter end of his life by the patriarch of Jerufalem, and died about the year 750. He was author of a great variety of pieces in theology, philofophy, and ecclefiaftical hiftory, which exhibit ftriking proofs of extenfive erudition and eminent talents. The beft edition of Damafcenus's works confifts of two vols. fol. printed at Paris, in 1712. The Arabians were much indebted to this Chriftian philofopher for their deliverance from barbarifm. Among his writings is an explanation of dialectics under the title of "Heads of Philofophy;" "Differtations on the three Parts of the Soul;" "An accurate Delineation of the orthodox Faith." This latter work, fays Dr. Enfield, is perhaps the firft attempt that was made to apply the language and arrangements of the peripatetic philofophy to theology, and to form what has fince been called a "body of divinity." Hence fome have confidered this Chriftian father as the father of the fcholaftics. His example was afterwards followed by a long train of Chriftian writers. To him, therefore, ought to be afcribed, in a great meafure, the mifchiefs which arofe from the alliance which he introduced between the doctrines of Chrift and the dogmas of Ariftotle. Moreri. Brucker by Enfield. *John Damafcenus* is celebrated by the writers of his life, and by ecclefiaftical hiftorians, as the compiler and reformer of chants in the Greek church, in the fame manner as St. Gregory in the Roman. And Leo Allatius (De Libris Ecclef. Græcorum) under the title *Octoëchus* (Οκτωηχ☉, eight Tones), tells us they were compofed by J. Damafcenus. Zarlino goes ftill farther, and informs us (Inftit. Harm. 4ta. parte. cap. viii.) that in the firft ages of Chriftianity the ancient Greek notation by letters having been thrown afide, John Damafcenus invented new characters, which he accommodated to the Greek ecclefiaftical tones; and that thefe characters did not, like ours, merely exprefs fingle founds, but all the intervals ufed in melody: as a femitone, tone, third minor, third major, &c. afcending and defcending, with their different duration. This refembles, in many particulars, the notation of the ecclefiaftical books of the Romifh church, before the time-table and characters in prefent ufe were invented, or, at leaft, generally received.

DAMASCIUS, a gentile philofopher, was born at Damafcus, and flourifhed in the fixth century. He ftudied at Athens and Alexandria under the ableft mafters of the age in which he lived. Theon was his mafter in rhetoric, and him he fucceeded in his office, as he did alfo Ifidorus as teacher of philofophy at Athens. From Athens he went to Alexandria, and prefided in the philofophical fchool in that city; but he was obliged to withdraw, on account of the perfecutions which were exercifed at that period by the emperor Juftinian againft the gentile philofophers. Damafcius fled to Perfia, and after this we have no certain accounts of what happened to him. He was author of the "Lives of Ifidorus and others." He wrote alfo "Commentaries on Plato;" and a treatife "concerning things extraordinary and furprizing." All his works are marked with the characters of the eclectic fchool, obfcurity, fanaticifm, and impofture. Moreri. Brucker by Enfield.

DAMASCUS, in *Geography*, a celebrated town of Afia, once the metropolis of Syria, and, in the time of Strabo, a moft confpicuous city. The emperor Julian, furnamed the Apoftate, ftyles it "the eye of all the Eaft, the facred and moft magnificent Damafcus;" and commends it on account of its temples, fountains, rivers, and alfo the richnefs and fertility of its foil. It was fituated, at the diftance of 50 miles from the fea, from which it was feparated by lofty mountains, on two rivers, *viz.* Amanah or Abara, which paffed through it, and Parphar, called by the Greeks Chryforrhœa, which ran on the outfide of its walls. Some ancient writers have afcribed its origin to one Damafcus, who built it, and from whom it derived its name; but the more generally received opinion is, that it was founded by Uz, the eldeft fon of Aram. (Bochart, Geog. Sacr. l. ii. c. 8. Oper. t. i. p. 80). However this be, Damafcus fubfifted in the time of Abraham, and may be reckoned one of the moft ancient cities now in being. Some have faid, that Abraham reigned in this city immediately after its founder Damafcus. According to Jofephus, Adad was the firft perfon who affumed the title of king of Damafcus; and he was vanquifhed by David. It was captured and ruined by Tiglath-Pilefer, king of Affyria, who carried away captive its inhabitants to Kin, on the other fide of the Euphrates, B. C. 740; thus fulfilling the predictions of the prophet Ifaiah (xvii. 1—3.) and Amos (i. 4, 5.) It was alfo taken by Sennacherib, and by the generals of Alexander the Great. Metellus and Lælius feized it during the war of Pompey with Tigranes the Great, B. C. 65; and it remained under the dominion of the Romans, until the Saracens took poffeffion of it about A.D. 634. Under Auguftus, Obodas, father of Aretas, king of Arabia, was ruler of Damafcus; and Aretas was governor when St. Paul was there. It continued for a long time fubject to the emperors, and was one of the five arfenals which they had in the eaft. After feveral revolutions and viciffitudes, (for an account of which fee SYRIA,) Damafcus was befieged and taken, A.D. 1400, by Tamerlane, who put all the inhabitants to the fword. When the Egyptian Mamelukes gained poffeffion of Syria, they repaired Damafcus. Selim, emperor of the Turks, took poffeffion of Syria, A.D. 1516, after the battle of Aleppo, in which the Mamelukes were defeated; and it ftill remains a province of the Turkifh dominions. It was from the territory of this city, that the prunes of Damafcus, called by the Romans "pruna Damafcena," derived their name.

Damafcus is now the capital of a pachalic. (See the next article.) The Arabs call it *El-fham*, and the oriental name of *Demefhk* is known only to geographers. It is fituated on an extenfive plain, occupied by gardens to the length of more than 3 leagues, and the breadth of more than $1\frac{1}{2}$ league. Its walls are of a circular form, and the fuburbs large and irregular. It is open to the fouth and eaft, and fhut in towards the weft and north by mountains, which limit the view at no great diftance. The rivulets which flow from the adjacent mountains render the territory of Damafcus the beft watered and moft delicious province of all Syria; the Arabs fpeak of it with enthufiafm; and think they can never fufficiently extol the frefhnefs and verdure of its orchards, the abundance and variety of its fruits, its nu-

merous ſtreams, and the clearneſs of its rills and fountains. This is the only part of Syria in which are detached pleaſure-houſes in the open country.

The ſoil, though poor, gravelly, of a reddiſh colour, and therefore ill adapted to corn, is more ſuitable to fruits, which are here excellently flavoured. No city contains ſo many canals and fountains; each houſe has one; and all theſe waters are furniſhed by three rivulets, or branches of the ſame river, called Barrady or Barradé, which, after fertilizing the gardens for a courſe of 3 leagues, flow into a hollow of the deſert to the ſouth-eaſt, where they form a moraſs called "Behairat-el-Merdi," or the lake of the meadow. Damaſcus, though poſſeſſing various advantages, is ſtill deficient in point of ſalubrity. The white waters of the Barradé are cold and hard; and the natives are ſubject to obſtructions; the whiteneſs of their ſkin is rather the paleneſs of ſickneſs than the hue of health; and the immoderate uſe of fruit, particularly of apricots, however excellent in their kind, occaſions, every ſummer and autumn, intermittent fevers and dyſenteries. It is ſaid, however, that the air or water of Damaſcus, or both, operates powerfully againſt the leproſy. Damaſcus is much longer than it is broad. Its walls, which are neither ancient nor lofty, are ſtrong. They have nine gates. M. Niebuhr, who has given a plan of the city, eſtimates it at 3250 toiſes, or ſomewhat leſs than 1½ league in circumference. Comparing theſe dimenſions with thoſe of Aleppo, Volney ſuppoſes that Damaſcus may contain 80,000 inhabitants. Browne, in his Travels in Africa, computes them at 200,000. The houſes fronting the ſtreets, which are generally broad, are very indifferent; but towards the gardens they preſent a handſome appearance. The market-places are well conſtructed, and ornamented with a rich colonade of variegated marble. The city is divided into 23 diſtricts, each under its diſtinct magiſtrate: that allotted to the Chriſtians is mean, and much inferior to the other parts of the town. The greater part of the inhabitants conſiſts of Arabs and Turks; the number of Chriſtians is eſtimated at above 15,000, two-thirds of whom, ſays Volney, are ſchiſmatics. The Turks never ſpeak of the people of Damaſcus, without obſerving that they are the moſt miſchievous in the whole empire; and the Arabs have this proverb, "Shami, ſhoumi," the man of Damaſcus, wicked. Such is the prejudice ariſing from difference of religion, that the Chriſtians are generally hated by the fanatic and inſolent Mahometans, and repreſented as more vile and knaviſh than they are any where elſe. Accordingly they have been accuſtomed to deteſt the Franks, ſo that it is not poſſible to appear at Damaſcus in an European dreſs. This malignant ſpirit, however, is of late ſomewhat meliorated. The hatred which the people of Damaſcus bear to the Chriſtians is maintained and increaſed by their communication with Mecca. Their city, they ſay, is a holy place, ſince it is one of the gates of the Caaba; for Damaſcus is the rendezvous for all the pilgrims from the north of Aſia, as Cairo is for thoſe from Africa. This circumſtance has given to Damaſcus the title of "Mahomet's heel." See Caravan. Hence Damaſcus is the ſeat of a conſiderable trade; and its manufactures afford ſupport to a great number of Mahometans and Chriſtians: theſe conſiſt of ſilk and cotton, mixed or ſeparate, but chiefly mingled together, in the form of what they call *cottoni* or *alléja*. The former requires 125 drams of ſilk; and the latter is lighter, and compoſed of half the quantity. Much ſoap is alſo fabricated at Damaſcus, and carried from hence to other parts of Syria and to Egypt.

In the manufacture of ſoap, they uſe oil of olives, putting to an hundred weight 25 pounds of kali, and 5 pounds of pulverized chalk. The latter articles are boiled till the water be ſufficiently impregnated; the oil is then poured in; and the whole boils for three days over a fire compoſed of ſtones of olives. Such of the European articles as are uſed by the orientals are drawn from Seidé, Beirût, and Tripoli, to and from all which places, there are regular caravans, iron, lead, tin, cochineal, broad-cloth. From Perſia and the Eaſt, the caravans of Bagdad convey ſhawls, muſlins, and the rich fabrics of Surat, a part of which is conſumed in the city, and a part paſſes on to other places in Syria, and to European Turkey. To maritime commerce the Damaſcenes were formerly very adverſe; and it is only within theſe few years that they could be prevailed on to ſend goods by ſea to Conſtantinople. The population and commerce of Damaſcus are on the increaſe, in conſequence of the juſtice and equity of the preſent pacha or baſhaw, Abdallah. The rent of houſes, though low, is ſenſibly increaſing by reaſon of the influx of ſtrangers, and the ſuburbs are ſpreading by new buildings. For an account of the ancient Damascus *ſteel*, ſee that article.

A ſtriking contraſt is obſerved to exiſt between the inhabitants of Damaſcus and thoſe of Aleppo. The latter are vain and ſeditious; the former, on the contrary, ſober, induſtrious, and unoſtentatious. The females and children have commonly regular features and a fair complexion; the dreſs of the women is nearly the ſame as at Conſtantinople, *viz.* white muſlin veils, except the proſtitutes, who, as uſual all over the Eaſt, expoſe their faces. The charitable eſtabliſhments in Damaſcus are numerous; among which may be noted that conſtructed by ſultan Selim for the reception of ſtrangers; though his munificence has been ſince diverted into other channels. The building conſiſts of a very large quadrangle, lined with a colonade. It is entirely roofed in ſmall domes, covered with lead. The moſque is grand; the entrance ſupported by four large columns of red granite: it is covered with a cupola, and has two minarets. Adjacent to it is a large garden. The apartments are numerous; and the whole eſtabliſhment grand and magnificent.

The large ſquare courts of the city are beautified with fragrant trees, and marble fountains, and compaſſed round with ſplendid apartments. In theſe apartments the ceilings and traves are uſually painted and gilded; and their duans, which are a ſort of low ſtages, ſituated in the pleaſanteſt part of the room, elevated about 16 or 18 inches above the floor, on which the Turks eat, ſleep, ſmoke, receive viſits, ſay their prayers, &c. are adorned on the ſides with a variety of marble mixed in Moſaic knots and mazes, ſpread with carpets, and furniſhed all round with bolſters and cuſhions in the very higheſt degree of luxury. In this city, ſays Maundrell, is ſhewn the church of John the Baptiſt, now converted into a famous moſque; the houſe of Ananias, which is only a ſmall grotto, or cellar; and the houſe of Judas, with whom St. Paul lodged, in which is an old tomb, ſuppoſed to be the burying place of Ananias, which is held in ſuch veneration, that a lamp is continually burning over it. To this account we may add, that the fruit-tree called the Damaſcene, and the flower called the damaſk-roſe, were tranſplanted from the gardens belonging to this city; and that the ſilks and linen, known by the name of damaſks, were, probably, the invention of its inhabitants. Volney's Travels in Egypt and Syria, vol. ii. De Pages's Travels, vol. ii. Browne's Travels in Africa, p. 396, &c.

Damascus, *Pachalic of*, is one of the four pachalics of Syria, comprehending nearly the whole eaſtern part of that country. It extends to the north from Marra on the road to Aleppo, as far as Hebroun or Hebron, in the ſouth-eaſt part of Paleſtine. It is bounded to the weſt by the mountains

tains of the Anfarians, thofe of Anti-Lebanon, and the upper part of the Jordan; then croffing that river in the country of Bifan, it includes Nablous, Jerufalem, and Hebroun, and enters the defert to the eaft, into which it advances more or lefs, as the country is capable of cultivation; but in general it does not extend to any confiderable diftance from the latter mountains, except where it approaches Tadmor or Palmyra, towards which it ftretches full five days' journey. In this vaft extent of country, the foil and its productions are very various; but the plains of the Hauran, and thofe on the banks of the Orontes, are the moft fertile; they produce wheat, barley, doura or durra, fefamum, and cotton. The foil of the country of Damafcus, and the Upper Bekaa, is gravelly and poor, better adapted to fruits and tobacco than to any thing elfe. On the mountains are cultivated, olive, mulberry, and fruit trees, and in fome places vines, from which the Greeks make wine, and the Mahometans dried raifins. The pacha enjoys privileges more confiderable than thofe of any other pachalic; for befides the farm of all the cuftoms and impofts, and an abfolute authority, he is alfo conductor of the facred caravan of Mecca, under the highly refpected title of "Emir Hadj." The Mahometans regard this office with fuch reverence, that a pacha, who acquits himfelf well in it, becomes inviolable even by the fultan, nor is it permitted to fhed his blood. But the divan has contrived to fatisfy his vengeance, without infringing this privilege, by ordering thofe who incur his difpleafure to be pounded in a mortar, or fmothered in a fack, of which there have been various inftances. The tribute of the pacha to the fultan is no more than 45 purfes, *i.e.* 2343 *l.*; but he is charged with all the expences of the Hodj, eftimated at 6000 purfes, or 312,500 *l.* They confift of provifions of corn, barley, rice, &c. and the hire of camels, which muft be provided for the efcort, and a great number of pilgrims. Befides this, 800 purfes muft be paid to the Arab tribes, who dwell near the road, to fecure a free paffage. The pacha reimburfes himfelf by the miri, or duty upon lands, either by collecting it himfelf, or farming it out. The pacha is alfo heir of all the pilgrims who die on the journey; and, befides, he has the profits from lending money upon intereft to merchants and farmers, and taking from them whatever he thinks proper in the way of *balfe* or extortion. His military eftablifhment confifts of 6 or 700 janizaries, as many Barbary Arabs, who are naked and plunderers, and 8 or 900 dellibafhes, or horfemen. Thefe ferve as an efcort for the caravan, and for reftraining the Arabs, and likewife to enable him to collect the miri from his own fubjects. The pachalic of Damafcus, though more expofed than any other to the incurfions of the Bedouin Arabs, is the leaft ravaged of any in Syria: and the reafon is, that this pachalic is ufually held for life. Volney's Travels, vol. ii.

DAMASCUS *fteel*, a very fine kind of fteel, made in fome parts of the Levant, and particularly at Damafcus, remarkable for its excellent temper; and ufed chiefly in the making of fword blades.

Some authors affure us it comes from the kingdom of Golconda in the Eaft Indies; where the method of tempering with alum, which the Europeans have never been able to imitate, was firft invented.

About the beginning of the 14th century, Timûr Leng, on his conqueft of Syria, conveyed all the celebrated manufactures of fteel from Damafcus into Perfia. Since that period, its works in fteel have been little memorable. They were formerly of the higheft reputation in Europe and the Eaft. The famous fabres appear to have been conftructed by a method now loft, of alternate layers, about two or three lines thick, of iron and fteel: they never broke, though bent in the moft violent manner, and yet retained the utmoft power of edge, fo that common irons or even fteel, would divide, under their force.

DAMASENSA, in *Geography*, a town of Africa, in the country of Jagra, fituated on a river of the fame name, which runs into the river Gambia.

DAMASI MONTES, or DOBASSI MONTES, in *Ancient Geography*, mountains of India, which, according to Ptolemy, extended along the 32d or 33d degree of latitude. It is thought that they were the mountains which bounded the eftates of the Great Mogul and thofe of the king of Ava to the north.

DAMASK, French *Damas*, in the *Manufacture of Cloth*, is a tweeled fabric, with flowers, or other ornaments, raifed upon it, generally of very extenfive patterns.

It has been conjectured, from the fimilarity of the name, that this branch of the art of weaving originated at Damafcus. Whether this etymology be correct or not, damafk has been long woven in filk, both in France and Italy. We find in many of our own popular ballads and legends, that a damafk gown or bed is frequently noticed as an article of magnificence.

The damafk manufacture of the continent was chiefly of filk for garments and ornamental furniture, fuch as bed-hangings, table-linen, and the like. The filk damafk was frequently woven with a great variety of colours, and produced a very beautiful effect. It is not exactly afcertained at what period the art of weaving this fpecies of cloth was introduced into Britain; but it is probable that it was brought over in queen Elizabeth's reign, by the Dutch and Flemifh weavers, who fled from the perfecutions of the duke of Alva, and his mafter Philip II. of Spain. The filk damafk, from the high price of the raw material, and the great labour of mounting and working the looms, was very expenfive, and, among the middling ranks of people articles of this kind were only worn upon occafions of ceremony, and at all other times carefully preferved, and frequently tranfmitted for feveral fucceffive generations in the fame family. The more modern practice of purchafing articles of drefs at moderate rates, and changing them frequently according to the variations of tafte or fafhion, has almoft entirely exploded the ufe of filk damafk, at leaft in Britain. This branch of ornamental manufacture is now almoft entirely confined to the fabrication of table-linen, which is manufactured to great extent, and in great variety. The chief feat of this manufacture is probably the town and neighbourhood of Dunfermline, in Fifefhire, where it is confidered as the ftaple, and has proved a very profitable branch of traffic to the manufacturer, and given employment to many induftrious people.

The material ufed there is chiefly linen; but many have been recently woven of cotton, fince the introduction of that article into the manufacture of cloth has become fo prevalent. The cotton damafks are confiderably cheaper than thofe of linen; but are not confidered either fo elegant or durable. The cotton, alfo, unlefs frequently bleached, does not preferve the purity of the white colour nearly fo well as the linen.

The tweeling of the more common kinds of damafk is generally performed with five leaves of front mounting, exclufive of the harnefs of the draw loom. The fineft and moft extenfively ornamented damafks are woven with eight leaves. The patterns of the damafk, which are frequently very extenfive, are called *defigns*, and are drawn upon paper lined into fmall fquares to direct the weaver in mounting his loom, fo as to produce the defign required.

For

For a particular deſcription of the proceſs of manufacturing damaſk, ſee the articles DESIGN, and DRAW-LOOM.

DAMASKEENING, the art, or act, of adorning iron, ſteel, &c. by making inciſions therein, and filling them up with gold or ſilver wire; chiefly uſed in enriching ſword-blades, guards and gripes, locks of piſtols, &c.

Its name ſhews the place of its origin, or, at leaſt, the place where it has been practiſed in the greateſt perfection, *viz.* the city of Damaſcus in Syria; though M. Felibien attributes the perfection of the art to his countryman Curſinet, who wrought under the reign of king Henry IV.

Damaſkeening is partly moſaic work, partly engraving, and partly carving; as moſaic work it conſiſts of pieces inlaid; as engraving, the metal is indented, or cut in creux; and as carving, gold and ſilver are wrought therein in *relievo.*

There are two ways of damaſkeening; in the firſt, which is the moſt beautiful, the artiſts cut into the metal with a graver, and other tools proper for engraving on ſteel; and afterwards fill up the inciſions, or notches, with a pretty thick ſilver or gold wire. In the other, which is only ſuperficial, they content themſelves to make hatches, or ſtrokes acroſs the iron, &c. with a cutting-knife, ſuch as is uſed in making of ſmall files. As to the firſt, it is neceſſary the gravings, or inciſions, be made in the dove-tail form; that the gold or ſilver wire, which is thruſt forcibly into them, may adhere the more ſtrongly. As to the ſecond, which is the more uſual, the method is this: having heated the ſteel till it changes to a violet, or blue colour, they hatch it over and acroſs with the knife; then draw the enſign, or ornament, intended, on this hatching, with a fine braſs point, or bodkin. This done, they take fine gold wire, and conducting or chaſing it according to the figures already deſigned, they ſink it carefully into the hatches of the metal with a copper tool.

DAMASONIUM, in *Botany*. See ALISMA and STRATIOTES.

DAMASQUITTE, a kind of ſtuff made at Venice, of which there are two ſorts; one with gold, the other with ſilk; the pieces are eighteen ells long.

DAMASSIN, a kind of damaſk, with gold and ſilver flowers, made in warp and woof, or wrought, and not raw ſilk.

DAMASUS I., POPE, in *Biography*, ſuppoſed to be a Spaniard by birth, obtained the high rank of biſhop of Rome in the year 366. In competition for this office he had for a rival Urſinus, to whom a large body of the people and clergy was attached. The conteſt on this occaſion involved the city in a civil war, in which much miſchief was done, and much cruelty perpetrated. Both were proclaimed lawful biſhops, and ſucceſſors to St. Peter at the ſame time; each was, however, too jealous of his rival to admit the poſſibility of a two-fold power. Damaſus at length proved triumphant; Urſinus and his adherents were baniſhed, having firſt ſuffered the penalties of impriſonment and confiſcation. Damaſus was more attached to the pomp, parade, and luxury of the temporal ſtate, than to the decorum and diſcipline which he owed to his rank as biſhop of ſouls. He ſeemed to be totally regardleſs of the morals of the people entruſted to his care; but againſt hereſy, as it was called, he diſplayed the vigilance and zeal of a bitter perſecutor. In five different councils held at Rome between the years 368 and 381, he procured decrees againſt the Arians, and other ſects who had departed from the eſtabliſhed faith; and prevailed on the imperial court to enact penal laws againſt them, which were executed with the utmoſt rigour. Damaſus extended the power and authority of the biſhops of Rome, and laid the foundation of the cuſtom of conferring upon certain biſhops the title of vicars to the pope, by which they were enabled to perform ſeveral authoritative acts, which they could not by the mere virtue of epiſcopal power: hence the rights of biſhops and ſynods became gradually and entirely dependent on the authority of the pope. Damaſus died at Rome in the year 384. His works are partly in proſe, and partly in verſe; they were printed at Rome in 1639, and at Paris in 1672, but they ſeem to have little claim to any ſpecific notice. They are treated of at large by Moreri, to whom we refer for a further account.

DAMASUS II., *Pope*, in the eleventh century, was a native of Bavaria. He is repreſented to have been a perſon of learning, and exemplary piety. He was poſſeſſor of the biſhoprics of Brixen and Aquileia in ſucceſſion, before he attained to the ſee of Rome, which happened upon the death of Clement II. To this dignity he was raiſed by the emperor Henry III., who ſent him to Rome to maintain the imperial right of nomination to the popedom, in oppoſition to the claims of Benedict IX., who had ſeized on it, but who quitted his pretenſions in favour of one who had ſo powerful a protector. Damaſus enjoyed his office only a few days, dying at Preneſte in 1048, ſuppoſed to have been poiſoned. Moreri.

DAMATCORENSIS, in *Ancient Geography*, an epiſcopal city of Proconſular Africa.

DAMATER, or DEMETER, in *Mythology*, the ſurname of Ceres. Vocabatur Ceres, Δημητηρ, quaſi Γημητηρ. *i. e.* Terra mater. Serv. in Virgil Æneid. iii. She derived this name from her having firſt taught men the art of cultivating the earth.

DAMATRIUS, in *Ancient Chronology*, the Bœotian name of the Athenian month *Pyanepſion*, which was the fifth of their year, and correſponded to the latter part of our October and beginning of November. See PYANEPSION and MONTH.

DAMAZAN, in *Geography*. See DAMASAN.

DAMBACH, a town of France, in the department of the Lower Rhine; $6\frac{1}{2}$ leagues S.S.E. of Straſburg.—Alſo, a town of Germany, in the arch-duchy of Auſtria; 8 miles E.S.E. of Freuſtadt.

DAMBANNA, a town of Africa, in the kingdom of Kontu.

DAMBEK, or DAMKE, a town of Germany, in the circle of Upper Saxony, and Old Mark of Brandenburg; 4 miles S. of Saltwedel.

DAMBI, a country of Africa, in the kingdom of Kongo, which, together with other inferior provinces, followed the example of the duchy of Ovando, and ſhook off the yoke of the kings of Kongo, to put themſelves under the protection of the Portugueſe, induced by the hopes, and perhaps the promiſes of being leſs oppreſſed, and of enjoying greater liberty under theſe than they did under their own monarchs.

DAMBLAIN, a town of France, in the department of the Voſges and diſtrict of La Marche; 5 miles E. of La Marche.

DAMBROUCZA, a town of Poland, in the palatinate of Lemberg; 8 miles N.E. of Lemberg.

DAME was formerly a title of honour, and is ſtill uſed in the Engliſh law to denote a lady; but in common acceptation it ſignifies the miſtreſs of a family of the lower rank in the country.

DAME, (from *domna*, the abbreviation of *Domina*,) the title of nuns of the Benedictine and certain other ancient orders. See DOMNUS and NUN.

DAME'S-*Violet*. See HESPERIS.

DAMEL,

DAMEL, or Kayo, in *Geography*, a country of Africa, on the coaft of the Atlantic, between the rivers Senegal and Gambia.

DAMELEN, a town of Germany, in the circle of Upper Saxony, and Middle Mark of Brandenburg; 6 miles W. of Belitz.

DAMELOPRE, a kind of bilander ufed in Holland, for conveying merchandize from one canal to another, and contrived for commodious paffage under the bridges.

DAMENSII, in *Ancient Geography*, a people of Africa, occupying the interior of the region called Syrtica.

DAMERAUCOUR, in *Geography*, a fmall town of France, in the department of the Somme, 6 miles S. of Foix.

DAMERISCOTTA *Bay*, *River*, and *Pond*, in America, in the ftate of Maine. The *bay* communicates with Townfend harbour, or Booth-bay; the *river*, which is navigable 15 miles, and on which are feveral mills, is fhort, is parallel with Sheepfcot river, E. of it, divides the town of Boothbay from Briftol, and rifes in Damerifcotta *pond*, which is about 10 miles long and 2 wide, and fpreads between Newcaftle and Waldoborough.

DAMERSHEIM, a town of Germany, in the circle of Bavaria, and principality of Neuburg; 10 miles N.W. of Neuburg.

DAMERY, a fmall town of France in the department of the Marne, between Ay and Chatillon on the river Marne, 3 miles W. of Epernay, remarkable for its excellent red Champaign, known by the name of Oeil de Perdrix.

DAMGARTEN, or Damgard, and anciently *Damgur*, *Damgor*, *Damagora*, a fmall town of Germany, in that part of Pomerania, which, having belonged to Sweden, is at prefent in poffeffion of the French. It is fituated on an eminence not far from the river Reckenitz, 21 miles W. of Stralfund. N. lat. 54° 20′.

DAMIA, in *Mythology*, a pagan divinity, or the good goddefs, faid by Varro to be the wife of Faunus, and by Macrobius to be Cybele, and fo chafte, that fhe never faw nor heard any other man than her own hufband. Her facrifice, which was privately offered on the firft day of May, in houfes, having their doors and windows fhut, was called Damium. No man, nor picture of a male, was fuffered to be prefent, nor woman to reveal what paffed. They fpent nights and days in this feftival, magnificently apparelled; danced, fung, and took what liberties they pleafed. Δαμιον, it is faid, is a word of the Doric dialect, and is put for δημιον, *i. e.* δημοσιον, *public*. Some have taken this expreffion for an antiphrafis, as if it fignified that nothing was lefs public than this feftival; but we learn from Cicero, (Harufp. Refp. c. 17.) that this facrifice was offered to the good goddefs for the public. Cicero fays, that the places appointed for this folemnity were the houfes of the firft magiftrates, and that this privilege belonged to the confuls and priefts only.

DAMIAN, St., in *Geography*, a fmall town of France in the department of the Sture, which formerly was a part of Piedmont in Italy. It contains 1498 inhabitants, and is the chief place of a canton in the diftrict of Coni. The canton itfelf has 14 communes, with a population of 11,276 individuals.

DAMIANA, or Damina, in *Ancient Geography*, a town of Spain, in the country of the Edetani.

DAMIANI, in *Biography*, an opera finger, with a *foprano* voice, of confiderable merit. His voice is fweet and flexible, but not powerful. His tafte modern, but his fancy not very fertile in cadences and embellifhments. He came to England, in 1800, to fing at the Haymarket, but from fome difference between him and the manager, he tore his article and threw it in the fire, and only performed at a concert eftablifhed on the merit of his talents by the worthy Raimondi, on a fuppofition that the public not being able to hear him at the opera, would be curious, and eagerly fubfcribe to a concert where he was to perform, but though a good finger, his talents and fame were not of that tranfcendent kind which incline lovers of mufic to think it neceffary to hear him in order to qualify themfelves for converfation; and Damiani, who was highly paid for his performance, though he increafed his fortune by the engagement, did not augment his fame.

DAMIANISTS, in *Ecclefiaftical Hiftory*, a branch of the ancient Acephalous Severites; who agreed with the Catholics in admitting the fourth council; but difowned any diftinction of perfons in the Godhead, and profeffed one fingle nature incapable of any difference; and yet they called God, the Father, Son, and Holy Ghoft. On which account the Severitæ Petritæ, another branch of Acephali, ufed to call them Sabellianifts, and fometimes Tetraditæ. Thus much we learn from Nicephorus Calliftus, lib. xviii. cap. 49.

They took their name from *Damianus*, a bifhop of Alexandria, who was originally their leader, in the fixth century.

DAMIANO, Peter, in *Biography*, was born at Ravenna in the beginning of the eleventh century. His defcent was highly refpectable, and he enjoyed the advantages of a good education, which he improved with fo much diligence, as to render himfelf capable of offices of diftinguifhed truft, and importance. In the year 1057 he was created cardinal, by pope Stephen IX. much againft his own wifhes, which led him, it is faid, to prefer a private and a ftudious life to public honours. If he really defired privacy, he was unfortunate in being appointed to feveral good livings and appointments in the church. Under the pontificate of Nicholas II. he was fent papal legate to Milan, to reform the clerical abufes in that diocefe, and for other objects of ftate policy. Thefe duties he performed to the fatisfaction of his employers. Upon his return to Rome he became difgufted with the profligacy of manners which prevailed among all ranks of the people, and with a becoming zeal for the interefts of religion, expoftulated againft the ambitious interference of the pontiffs in the temporal concerns of princes, the univerfal relaxation of order and difcipline, and the enormous vices practifed by the monks and clergy. Finding that his remonftrances produced no good effect, he refolved to withdraw from a fociety, whofe manners he in vain attempted to reform; and having refigned his feveral preferments into the hands of pope Alexander II., he retired to a monaftery in 1061. Here he was not permitted to remain; his integrity and ability rendered him fit for fervices of active life, and he was fent, in 1062, papal legate to France. In the following years he was fent on miffions to Florence, and different parts of Germany. He died in the year 1073, highly refpected by his contemporaries; his works, which were numerous, entitle him to be ranked among the beft writers of the times in which he flourifhed.

Damiano, *Saint*, in *Geography*, a fmall town of France, in the department of the Tanaro, which formerly was a part of Piedmont in Italy. It is the chief place of a canton, in the diftrict of Afti, 9 miles N. of Alba, and has a population of 6109 individuals. The canton contains 5 communes and 11,347 inhabitants.

DAMIANOVITZ, a town of Croatia, 64 miles S. of Varaldin, and 52 E. S. E. of Carlftadt.

DAMIATTE, a fmall town of France, in the department of the Tarn, 12 miles W. of Caftres.

DAMICOTTA, a town of Hindooftan, in the Coimbetore country; 30 miles N. of Coimbetore, and 60 S. of Seringapatam. N. lat. 11° 28′. E. long. 41° 25′.

DAMIER, in *Conchyliology*, the name given by French naturalifts

naturalifts to that elegant fpecies of voluta, the fpots of which ftand in a checquered order, and refemble the marks of a draught or chefs board, that being the common fignification of the word *damier*. See VOLUTA.

DAMIETTA, or DAMIATT, in *Geography*, a fea-port town of Egypt, which forms a vaft crefcent at the mouth of the eaftern branch of the Nile. Steph. Byz. informs us that, under the government of the Greeks of the lower empire, it was called "Thamiatis," and that it was then very inconfiderable. But in proportion as Pelufium declined, it acquired increafing importance; and at length the total ruin of this ancient town occafioned the commerce of the eaftern ports of the Delta to be transferred to Damietta. When the emperors of Conftantinople took poffeffion of it a fecond time, about the year 238 of the Hegira, A. D. 852, the caliphs perceived the importance of a harbour fo favourably fituated; and in the year of the Hegira 244, A. D. 858, the emperor Elmetouakkel furrounded it with ftrong walls. Notwithftanding this defence, Roger, king of Sicily, took it from the Mahometans in the year of the Hegira 550, A. D. 1155; but foon after Salah Eddin, who mounted the throne of Egypt, expelled the Europeans from this city; and when they returned to befiege it, about 15 years after, this able fultan baffled all their efforts, and obliged them to retreat, though their land army was fupported by a fleet of 1200 fail. In the year 615 of the Hegira, A. D. 1218, under the reign of Eladel, the crufaders attacked it with a confiderable force; and having carried by ftorm the tower on the weftern fhore of the Nile, where they had encamped, and broken the ftrong iron chain, which reached from one fide to the other, they opened the entrance of the river for their fleet. Nejm Eddin, the fultan's fon, made a vigorous refiftance, threw a bridge over the river, which the Franks demolifhed, and choaked up the mouth of the river, which he rendered almoft impaffable, by finking feveral large boats. After alternate fucceffes and defeats, many bloody conflicts, and a fiege of 17 months, the Chriftian princes took Damietta by ftorm. However, their tenure was of fhort duration; for being completely invefted near the canal of Achmoun, ¼ of a league N. of Manfoura, where St. Lewis finifhed his exploits, by the waters of the Nile and by the Egyptian army, they purchafed their lives and liberty by the furrender of their conqueft. Thirty-one years after this defeat, St. Lewis carried Damietta without ftriking a ftroke. Having thrown himfelf into the waves, in complete armour, to march upon the enemy intrenched upon its banks, he thus ftruck a panic into their army, fo that they took flight, and fhamefully abandoned a fortrefs filled with flaves, and capable of a long refiftance. The Arabs foon recovered it, but tired of defending it, they totally deftroyed it, and rebuilt it further up in the country. "Damietta being deftroyed, (fays Abulfeda) a fmall town was built at fome diftance, called *Menchié*, which is become a confiderable place. In our days (100 years after its foundation) we fee feveral fquares, market-places, and public baths. The ancient city was razed to the ground in the year 648 of the Hegira," (A. D. 1250); or, as fome Arabian hiftorians fay, 4 years before this epocha. "The caliph Elmetouakkel, of the family of the Abaffides, built the walls. The misfortunes it had occafioned to the Mahometans, and the wars to which it had given rife, drove them to that extremity. It feemed, in fact, as if this fortrefs, in a peculiar manner, invited the Franks, who alternately laid fiege to the walls." When the French threatened Egypt a fecond time, it was refolved to deftroy Damietta; and it was fo completely razed to the ground, that there remained no veftige of it, except the great mofque. Its ruins are difcernible at the village of Efbé, on the eaftern bank of the Nile, a fhort league from the fea, which diftance has been gained by the Delta in the courfe of 600 years. Eleven years after this time the mouth of the Nile was choked up by a bar, which is called Bogaz, fo as to prevent the enemy's fleets from getting up the river, and to render accefs as dangerous as that of Rofetta. It is now impaffable, even for boats, during feveral months of the year, and fhipwrecks frequently occur here. From this epocha its entrance is prohibited to all veffels, which are now obliged to anchor in the road. The town of Damietta, now fubfifting, was built after the deftruction of the ancient city; and it is fituated a little above it on the fame fide, or about 1½ league diftant from the village of Efbé, where the traces of the former are difcoverable. The modern Damietta, firft called *Menchié*, as Abulfeda tells us, has preferved the memory of its origin in a fquare ftill called by that name. Writers in general have confounded thefe two towns, and afcribed to the one the attributes of the other. This is the cafe with father Sicard, Pocock, Profper Alpinus, Maillet, Shaw, and even Niebuhr. The towers, which have led writers to take the modern for the ancient Damietta, were built by the Mamelukes for the defence of the new town. As they were ufelefs, they have demolifhed one, and employed its materials in the conftruction of a fmall fort, which is at the mouth of the river. This place, fays Savary, who paffed 14 months in it, is large, and not lefs agreeable, than Rofetta, is rounded in a femicircle on the eaftern bank of the Nile, 2½ leagues from the mouth of it. The eye, placed at one of the extremities of the crefcent, takes in its whole extent. It is reckoned to contain 80,000 inhabitants. It has feveral fquares, the moft confiderable of which has retained the name of *Menchié*. The bazars are filled with merchants. "Okals" or "khans," as fpacious as thofe of Boulak, collecting under their porticos the ftuffs of India, the filks of mount Lebanon, fal ammoniac, and pyramids of rice, proclaim that it is a commercial town. The houfes, efpecially thofe on the banks of the river, are very lofty. They have, in general, handfome faloons built on the tops of their terraces, which are cheerful belvideres, open to every wind, where the Turk, effeminately reclining on a fopha, paffes his life in fmoking, in looking on the fea, which bounds the horizon on one fide, on the great lake that extends itfelf on the other, and on the Nile, which, running between them, traverfes a rich country. Several large mofques, adorned with lofty minarets, are difperfed over the town. The public baths, lined with marble, are diftributed in the fame manner as thofe of Grand Cairo. The linen with which you are ferved is clean, and the water very pure. The heat, and the treatment in them, fo far from injuring the health, ferve to ftrengthen, and even to improve it, if ufed with moderation.

The port of Damietta is continually filled with a multitude of boats and fmall veffels. Thefe called "Scherm" ferve to convey the merchandize on board the fhips in the road, and to unload them: the others carry on the coafting trade. This town carries on a great trade with Syria, Cyprus, and Marfeilles. The rice, called "Mezelaoui," of the fineft quality in Egypt, is cultivated in the neighbouring plains. The exports of it, fays Savary, amount annually to about 6 millions of livres. The other articles of the produce of the country are linens, fal ammoniac, corn, &c. A ruinous policy for the country prohibits the exportation of this laft article; but the law is evaded, and it paffes under the name of rice. The Chriftians of Aleppo and Damafcus, fettled in this town, have for feveral ages

carried on its principal commerce. No Christian merchant, or European, must, says Niebuhr, reside here; although there be in Damietta a considerable number of Maronites and Armenians, who communicate with the church of Rome. A consul, and French merchants, once resided at Damietta. But the inhabitants, observing that these strangers made too free with their women, rose up in a fury, and massacred them all. Since that period the king of France forbade his subjects not only to settle in this city, but even to frequent it. The inhabitants of Damietta are generally reckoned more unfriendly to the Christians than any of the other inhabitants of Egypt. The memory of the Crusades, perhaps, keeps up this inveterate aversion. In the neighbourhood of this city are many rice fields: but towards the shore, the ground is covered with sand, and consequently barren. As the Bogaz prevents ships from entering the Nile, their cargoes are conveyed on board by the boats of the country; and this circumstance affords opportunity for much fraud and dissension. The badness of the port of Damietta is still more detrimental to the commerce of the city. The road where the vessels lie being exposed to every wind, the slightest gale obliges the captains to cut their cables, and take shelter at Cyprus, or to stand off to sea. But did not the indolence and despotism of the Turks prevent it, it would be easy, by cutting a canal of half a league, to open a passage for ships into the Nile, where there is deep water; and thus Damietta would be rendered a noble harbour.

The tongue of land on which Damietta is situated, straightened on one side by the river, and on the other by the western extremity of the lake Menzalé, is only from two to six miles wide from east to west. It is intersected by innumerable rivulets in every direction, which render it the most fertile spot in Egypt. The soil produces, *communibus annis*, 80 bushels of rice for one; the other produce is in the same proportion. Nature here presents flowers, fruits, and harvests, at every season of the year. Winter never deprives it of these advantages; nor are its beauties ever impaired by summer. Destructive heats as well as chilling colds are equally unknown in this happy spot. The thermometer varies only from 9 to 24 degrees above the freezing point. Damietta is indebted for this charming temperature to the immense quantity of water, with which it is surrounded. The rivulets round the fields of rice are lined with several kinds of reeds, some of which rise to a great height. The reed *Calamus* is here found in abundance, and is used for writing by the orientals. Here are also forests of papyrus, of which the ancient Egyptians made their paper: the lotus also, called by the Arabs nuphar, exalts its lofty stalk above the waters, and diffuses from its flowers a most agreeable odour along the marshes and canals in the interior parts of the country.

There are many villages round Damietta, in most of which are manufactures, where the most beautiful linens of the country are fabricated: and, in particular, the finest napkins, fringed with silk, are made here. These small towns, generally surrounded with little woods, or trees promiscuously planted, form a picturesque and whimsical assemblage. The elegant cassia-tree, with its clusters of yellow flowers, is seen by the side of the sycamore and tamarind; the date-tree lifts its head with enormous branches above the grove: the orange and lemon-trees cover the labourer's cabin with their golden fruit; the banana-tree, the pomegranate, and the fig-tree, with their different productions, throw a vast variety into these landscapes. At a mile from the town to the south-west is a grove of orange-trees, which serves as a walk for the inhabitants: at the end of the walk is a canal filled with papyrus. Damietta is distant 84 miles N.N.E. from Cairo. N. lat. 31° 25′ 44″. E. long. 31° 49′ 45″. Savary's Letters on Egypt, vol. i. Niebuhr's Travels in Arabia, &c. vol. i.

DAMINI, Pietro, in *Biography*, a painter, born at Castelfranco, in the year 1591. At an early period he received instructions from Gio. Batista Novelli, the scholar of Jacopo Palma, and a good colourist; but being desirous of making himself master, as well of the theory as the practical part of his art, he assiduously studied such prints and pictures as he could obtain access to, and improved himself by reading the works of Lomazzo and Albert Durer. Such was his reputation, that at the age of 20, he was employed upon a public work at Padua, where he established himself. Many of his works are to be found in that city as well as in Venice, Vicenza, and the place of his nativity. Singularly beautiful is the altar-picture of Beato Simone Stock, in the church of S. Maria, at Castelfranco, and another which is surrounded by 12 small pictures of stories from the Old and New Testament, which are executed with extraordinary taste.

Even in his short life, this artist several times changed his manner, in the attempt to obtain the perfection of the art: Sometimes he appears to have copied nature as he found her; at other times, as in his fine picture of the crucifixion in the church del Santo at Padua, he aspired to the representation of ideal beauty. He was carried off by the plague, in 1631, at a period when such high expectations were formed of him, that it was even thought by some he would have equalled the great Titian. Lanzi.

Damini, Giorgio, the brother of Pietro, was also a native of Castelfranco. He excelled in portrait and pictures of small figures, and his reputation was increasing, when, with his brother, he died of the plague in 1631, leaving a sister, named Damina, who also painted portrait. Lanzi.

DAMINS, in *Geography*, a town of Switzerland, in the Grey League; 10 miles N.N.E. of Ilantz.

DAMISCHE Sea, a large lake of Germany, or expansion of the Oder, in the circle of Upper Saxony, northward of the town of Damm; 8 miles long and about 1½ wide.

DAMIUPOLIS, in *Ancient Geography*, a town situated in the environs of Sebastopolis.

DAMM, in *Geography*, a small town of Prussia, in Pomerania, near the lake of the same name; 3 miles E. of Stettin. N. lat. 53° 4′.

DAMMA, in *Ancient Geography*, a town of Serica, placed by Ptolemy above Piada.

DAMMANA, a town of Asia in Arachosia. Ptolemy.

DAMMARIE, in *Geography*, a small town of France in the deparment of Eure and Loire, 9 miles S. of Chartres.—Also, a small town of France in the department of the Meuse, district of Bar sur Ornain, and canton of Ligny.

DAMMARTIN, in Latin, *Dominium Martini*, a small town of France, in the department of Seine and Marne, chief place of a canton in the district of Meaux, 27 miles N.E. of Paris, and 15 N.W. of Meaux. It has 1918, and the canton 11,129 inhabitants, 23 communes, and a territorial extent of 220 kiliometres.

Dammartin *sur Yevre*, a small town of France in the department of the Marne, district of Sainte Menehould, with a population of 312 individuals. It is the chief place of a canton, which contains 27 communes and 8134 inhabitants, upon a territorial extent of 380 kiliometres.

DAMME. See Dam.

DAMMER, a town in Silesia, in the principality of Oels; 4 miles S.E. of Militsch.

DAMMIM, or Daminim, in *Ancient Geography*, a town of

of Paleſtine, in the tribe of Juda, between Socho and Azeca; mentioned in the book of Kings.

DAMNA, a town of Scythia, on the other ſide of the Imaus. Ptolemy.—Alſo, a town of Paleſtine, in the tribe of Zebulun, allotted to the Levites of this tribe, who were of the family of Merari, mentioned in the book of Joſhua, and alſo by Euſebius and Jerome.

DAMNA, in *Geography*, a town of Arabia Deſerta; 80 miles S. of Damaſcus.

DAMNATA TERRA, ſynonymous with CAPUT *Mortuum*, which ſee.

DAMNÆ, in *Ancient Geography*, a people of Aſia, placed by Ptolemy in Serica.

DAMNII, in *Ancient Geography*, one of the 22 Britiſh nations, which, according to Ptolemy, inhabited that part of Britain, that lay on the ſouth of the wall of Antoninus, between the Friths of Forth and Clyde. They were, according to Camden and Baxter, the ancient inhabitants of Clydeſdale, Renfrew, Lenox, and Stirlingſhire. Their name, ſometimes written Dumnii, might perhaps be derived from the Britiſh word *Dun*, which ſignifies a hill or mountain; a great part of their country being hilly or mountainous. This was one of thoſe Britiſh nations, formerly unknown to the Romans, which were diſcovered by Agricola, in the third year of his government when he penetrated to the river Tay. It was in the country of the Damnii that Agricola built thoſe forts, into which he put his army in winter for the preſervation of his conqueſts: as it was in the ſame country, and probably in the ſame tract, that the famous wall was built in the reign of Antoninus Pius, to protect the Roman territories from the incurſions of the Caledonians. On account of this wall, and the many forts and caſtles upon it, this country was more frequented by the Romans than any other to the north of Severus's wall; and more remains of that illuſtrious people have been diſcovered in it than in any other part of Scotland. Their towns were Colonia, Vanduara, Coria, or Curia, Alauna, Lindum and Victoria.

DAMNONII, DANMONII, *Dumnonii*, *Dunmani*, or *Domnii*, a people of Great Britain, who inhabited the S.W. parts of Britain; or that tract of country now called Cornwall and Devonſhire, and probably part of Somerſetſhire; bounded on the S. by the Britiſh ocean, on the W. by St. George's channel, on the N. by the Severn ſea, and on the E. by the country of the Durotriges. Some other Britiſh tribes were alſo ſeated within theſe limits, as the Coſſini and Oſtedamnii, which were probably particular claſſes of the Damnonii; and, according to Mr. Baxter, were the keepers of their flocks and herds. As the ſeveral tribes of the Damnonii ſubmitted without much reſiſtance to the Romans, and never joined in any revolt againſt them, theſe people were under no neceſſity of building many forts, or keeping many garriſons in their country. Hence it happens that few Roman antiquities have been found in that country, and that they are ſeldom mentioned by Roman writers. Ptolemy mentions a few places on the ſea-coaſts and in the inland parts of this diſtrict, which were known to, and frequented by the Romans. The moſt conſiderable of theſe places are the famous promontories of Bolerium and Ocripum, now the Land's-End and the Lizard, and the towns of Iſca Damnoniorum and Tamare, now Exeter and Saltaſh. As the Damnonii ſubmitted quietly to the Romans, they might be allowed to live without moleſtation under their own princes and laws. In the moſt perfect ſtate of the Roman government in Britain, the country of the Damnonii made a part of the province called Flavia Cæſarienſis, and was governed by the preſident of that province. After the departure of the Romans, kingly government was immediately revived amongſt the Damnonii in the perſon of Vortigern, who was perhaps deſcended from the race of their ancient princes, as his name ſignifies in the Britiſh language a chieftain, or the head of a family.

DAMO, in *Biography*, daughter of Pythagoras the philoſopher, flouriſhed about 500 years before the preſent era. She was one of the favourite diſciples of her father, and was initiated by him in the ſecrets of his philoſophy. To her the ancient ſage entruſted all his writings, when he felt himſelf approaching his latter end; enjoining her never to make them public: this command ſhe ſtrictly obeyed, though tempted by large offers at a time when ſhe was ſtruggling with the evils of poverty. She led a ſingle life, in obedience to her father's wiſhes, and exhorted other young women, whoſe education ſhe took charge of, to do the ſame. See PYTHAGORAS.

DAMON, a Pythagorean philoſopher, who flouriſhed about 400 years before Chriſt, and who is celebrated for the friendſhip that ſubſiſted between him and Pythias, a philoſopher of the ſame ſect. One of theſe friends was condemned to death by Dionyſius, king of Syracuſe. He wiſhed for a reſpite for a few days, and liberty to depart from priſon to ſettle his affairs, on condition that the other ſhould take his place, and ſuffer in his ſtead, provided the condemned perſon did not return. The morning of the fatal day was come, and the youth had not ſurrendered: the attachment and confidence of his ſurety were now reproached by thoſe about him; but he felt no anxiety on his own account; he was ſure his friend would not and could not violate his promiſe, and he was juſtified in his belief by the actual ſurrender of his friend at the appointed hour. Dionyſius, ſtruck with the magnanimity of the one, and the fidelity of the other, freely forgave the offender, and entreated that he might be admitted to the participation of ſuch ſincere and diſintereſted friendſhip.

DAMON, an ancient Grecian muſician. Muſic, in general, was in ſuch favour, and the ſtudy of it was thought ſo eſſential a part of education, at Athens, in the time of Pericles and Socrates, that Plato and Plutarch have thought it neceſſary to inform us of whom thoſe two great perſonages received inſtructions in that art. Damon, the Athenian, was the muſic maſter of both. The philoſopher calls him his friend, in a dialogue of Plato, where Nicias, one of the interlocutors, informs the company, that Socrates had recommended, as a muſic maſter to his ſon, Damon, the diſciple of Agathocles, who not only excelled in his own profeſſion, but poſſeſſed every quality that could be wiſhed in a man to whom the care of youth was to be confided.

Damon had chiefly cultivated that part of muſic, which concerns time or cadence; for which he is highly commended by Plato, who ſeems to have regarded rhythm as the moſt eſſential part of muſic, and that upon which the morals of a people depended, more than upon melody, or, as the ancients called it, harmony. He is alſo mentioned by Ariſtides Quintilianus, as having excelled in characterizing his melodies, by a judicious choice of ſuch ſounds and intervals as were beſt adapted to the effects he intended to produce.

Pericles, the moſt accompliſhed character in antiquity, was not only a conſummate judge, but a great encourager of all the arts. And in his life, writen by Plutarch, we are told that the muſes bore a principal ſhare in all the public ſpectacles with which he entertained the people. He not only regulated and augmented the poetical and muſical conteſts

at the Panathenæan feftivals, but built the odeum, or mufic-room, in which poets and muficians daily exercifed themfelves in their art, and rehearfed new compofitions, before they were exhibited in the theatre.

Damon, William, an Englifh mufician, who flourifhed in the reign of queen Elizabeth, and who feems to have been the firft who compofed parts to the old German melodies that were fung by John Hufs, and the Bohemian brethren to the metrical pfalms. *Damon's* title to his publication is the following. "The Pfalmes of David in Englifh meter, with notes of foure partes fet unto them by Guilielmo Damon, to the ufe of the godly Chriftians, for recreating themfelves, infteде of fond and unfeemely balladеs, 1579."

Thefe parts not being well received by the public, he publifhed others in 1585, and dedicated them to the lord treafurer, Burleigh. We are in poffeffion of a *Miferere*, in five parts compofed by William Damon; obtained from Dr. Pepufch's collection, about the year 1746. The harmony is clear and good, and the fubject extremely fimple and uniform, the parts conftantly fing a tetracord in *motto contrario*: as $\left\{\begin{array}{l}\text{G F E D.}\\ \text{A B C} \sharp \text{D}\end{array}\right.$

DAMOT, in *Geography*, a province of Abyffinia, on the S.E. of the kingdom of Gojam; bounded by the Temei on the eaft, by the Gult on the weft, by the Nile on the fouth, and by the high mountains of Amid Amid on the north. It is about 40 miles in length from north to fouth, and fomewhat more than 20 in breadth from eaft to weft. But this whole peninfula, furrounded with the river, is called Gojam, in general terms, from a line drawn though the fouth end of the lake to Miné, the paffage of the Nile in the way to Narea. See Gojam.

DAMP, *adjective* (from the Dutch *dampe)*, denotes a perceptible degree of moifture in any thing; fuch as in damp air, damp walls, damp apartments, damp linen, &c. The methods of afcertaining the actual exiftence or degree of dampnefs in any thing, an examination of the effects which it is likely to produce, and the various ways of removing it, are the objects of philofophy, of medicine, and of civil economy; but as thofe objects will be particularly noticed in various other articles of this Cyclopedia, fuch as *evaporation, mifts, fogs, hygrometry, dew*, &c.; we fhall in this place only give a compendious and fuperficial idea of the whole. Almoft all natural bodies, excepting metallic fubftances, moft hard ftones, vitrifications, and a few more, contain at all times a certain quantity of water; yet they are confidered as being dry, when that quantity of water is not more than that which the affinity of the particles of the bodies to water can retain. But fhould that affinity (*viz.* that degree of attraction between the particles of thofe bodies and water) be diminifhed by any adequate caufe, or fhould the quantity of water exceed that which the peculiar affinity of each body can retain, then the bodies are faid to be damp, and they will appear to be fo, either by the mere touch of the human hand, or by the indications of hygrometers, and other inftruments. Thus, common atmofpherical air always contains a quantity of water which is perfectly diffolved in the air, and is retained by every particle of the latter, in virtue of their mutual attraction of affinity. But that affinity is diminifhed by cold, and is increafed by heat; therefore, if a quantity of air be cooled by any adequate means, its affinity to water will of courfe be diminifhed, and part of the water it contained will be feparated; forming a vapour which in fome meafure affects the tranfparency of the air, and is ready to attach itfelf to any other body which may be prefented to it in a ftate fit for the abforption of vapour. The air in that ftate is faid to be damp, and an hygrometer placed in it will fhew it to be fo, by its ufual movement towards moifture.

On the other hand, if cold air, which appears to be damp from the indications of hygrometers, or from moiftening falts, &c.; be rendered much hotter, its affinity to water will thereby be increafed, and the appearances of dampnefs will vanifh.

Befides the above-mentioned affinity, there is another power which enables bodies of every kind to retain water; and this is a fort of fuperficial adhefion. (See Capillary *Attraction.*) It acts moft powerfully when a given quantity of water is expofed to the action of a proportionately great quantity of furface; hence, all porous bodies have the power of retaining water to a certain degree, and under certain circumftances. Therefore, in a variety of bodies both thofe powers contribute to retain water at the fame time, and fuch moft probably is the cafe with air itfelf.

Sometimes bodies contain water proportionate to their degree of affinity, yet other bodies will rob them of a portion of that water; and fuch is the cafe with dry fixed alkalies, or frefh quick-lime, which will feparate water from air apparently very dry. This, however, only proves that certain bodies have a greater affinity to water than air or certain other bodies have.

In certain circumftances a greater quantity of moifture is crowded upon bodies than they can retain; hence they feel damp. Thus, the air which lies contiguous to water generally contains more moifture than the air which is more remote; but the latter by degrees abforbs the fuperfluous moifture of the former, and thereby enables it to imbibe more of the vapours which rife from the contiguous water; and thus the procefs of evaporation goes on. But if the free circulation or communication of the air be interrupted, then the air which is confined over the water will hold a confiderable quantity of fuperfluous moifture, and will thereby become damp. Now fuch is the cafe with the air of caves, cellars, holds of fhips, &c. when any water is contained in thofe places. From the above ftatement it evidently appears that heating and ventilation are the two moft powerful means of removing dampnefs. The action of heat diminifhes the attraction of folids to water, and increafes the affinity between air and the fame fluid. Ventilation, when the air is dryer than other bodies, removes dampnefs by diffipating the moifture through the atmofphere.

From the refult of all the experiments that have hitherto been inftituted, it appears, that a cubic foot of air faturated with water, contains two grains of water at the temperature of 32° Fah. (*viz.* at the point of melting ice); it contains four grains at the temperature of 48°, fix grains at the temperature of 60°, and eight grains at the temperature of 68°.

A remarkable circumftance attends the mixture of aqueous vapour with air, which is, that air thus faturated with vapour is lighter than an equal bulk of dryer air; and this arifes from the denfity of the vapour thus mixed, which is lefs than the denfity of the air, in the proportion of three to four, according to Sauffure.

The explanation of feveral natural phenomena may be eafily derived from the above-mentioned facts, attending, however, to other concomitant circumftances. Thus, in a calm day, when the air is ferene, a cold wind fprings up from the north or from the eaft, the cold air mixes with the warmer, their capacity for containing water is diminifhed, a hazinefs

hazineſs enſues, and the air becomes damp; yet ſometimes the cold air is dryer on account of particular circumſtances, and though a hazineſs may at firſt appear, a perfect tranſparency will be reſtored ſoon after.

It frequently happens, that the vapour which is ſeparated from the air by the action of cold, remains ſuſpended in the ſhape of a miſt or cloud; yet at other times it deſcends immediately, and attaches itſelf to terreſtrial bodies in the form of dew. But in theſe phenomena the action of electricity ſeems to be in great meaſure concerned. We ſhall have occaſion to examine the nature of thoſe phenomena more at large in other parts of this work.

The effects of damp air, damp clothing, and damp apartments, are variouſly modified by the climate, by the temperature, and by the cuſtoms of the inhabitants, of every particular country.

Damp, *noun ſubſtantive*, (from the Saxon *damp*, a vapour or exhalation,) means a fog, or moiſt air, or moiſture; but it is principally uſed in the plural, *damps*, to denote certain noxious vapours or exhalations iſſuing from the earth.

Theſe exhalations frequently occur in mines, coal-pits, wells, and other ſuch like excavations; but ſometimes they are alſo to be met with near the ſurface of the earth, eſpecially in the vicinity of volcanoes. The noxious quality of ſuch exhalations, and the numerous fatal effects which they have produced, have obliged mankind to collect the various accounts of the phenomena, to inveſtigate their origin, and to contrive methods of preventing their dire effects. But the accounts have been moſtly furniſhed by miners, whoſe ignorance, whoſe fears, and whoſe ſufferings, have generally involved the truth in a conſiderable proportion of exaggeration; yet, from a careful compariſon of thoſe very accounts, from the reſult of experiments inſtituted by ſcientific perſons, and from the knowledge of the ſubject of elaſtic fluids, which has, of late years, been wonderfully promoted; the nature of thoſe damps is at preſent pretty well aſcertained, and their effects may be ſufficiently accounted for; excepting, indeed, two or three ſtrange ſtories, which are in need either of hiſtorical confirmation, or of a much deeper philoſophical inveſtigation.

The general effect of the damps is a contamination of the common, or reſpirable, atmoſpherical air; by the admixture, not indeed of moiſture, as one might be led to underſtand by the name of damps, but of other elaſtic fluids, which are abſolutely unfit for animal reſpiration. *Carbonic acid gas*, (formerly called *fixed air*,) *azotic gas*, (formerly called *phlogiſticated air*,) and *hydrogen gas*, or *inflammable air*, are the three elaſtic fluids which generally, if not always, produce the damps: we ſhall, therefore, briefly premiſe the principal properties of theſe gaſes; in order that the nature of the damps may be underſtood without much circumlocution.

Carbonic acid gas is abſolutely unfit for reſpiration or for combuſtion; inſomuch, that an animal confined in it, will be deprived of life rather ſooner than if he were confined under water. A lighted candle or torch brought within a quantity of this gas, is extinguiſhed as readily as if it were dipped in water. This gas is heavier than common air, in the proportion of three to two; hence, when it iſſues out of the earth in hollow or ſheltered places, it remains for a conſiderable time in a ſtratum cloſe to the bottom of the place. Carbonic acid gas conſiſts of 72 parts of oxygen, and 28 parts of charcoal.

Azotic gas is likewiſe unfit for reſpiration and for combuſtion. Its ſpecific gravity is very little below that of common air. It is that gas which forms about three-fourths of the atmoſpherical fluid, the other quarter conſiſting principally of oxygen air. It is produced, or rather left by itſelf, whenever the oxygen of the atmoſpherical air is abſorbed, as is the caſe in combuſtion, reſpiration, and various other proceſſes.

Hydrogen gas is, by itſelf, utterly unfit for animal reſpiration; but when mixed with common air, it may be breathed with impunity. In its pureſt ſtate, hydrogen gas weighs rather leſs than the twelfth part of an equal bulk of common air; but as it is capable of holding in ſolution water, ſulphur, phoſphorus, carbon, &c. ſo its ſpecific gravity generally exceeds that which has been juſt ſtated; it is always, however, much lighter than common air; hence, when it occurs in mines, it is either actually iſſuing out of crevices, or it is lodged under the roofs of thoſe excavations. This gas is highly inflammable, ſo that it may be fired by the flame of a candle, or a very ſmall electric ſpark, or even by a red-hot iron; but, like other combuſtibles, it will burn only in contact with common, or oxygen, air; hence, if a lighted candle be preſented to a certain quantity of hydrogen gas, this will burn either ſilently and progreſſively, or ſuddenly, and with an exploſion, according as the common air is contiguous to one ſide of it, or is more or leſs intimately mixed with it. The greateſt exploſion takes place, when four parts of hydrogen gas are mixed with ſix of common air; the tint of the flame varies according to the ſubſtance diſſolved in the gas. This gas is produced principally in the decompoſition of water; for water conſiſts of oxygen and hydrogen gas; from which circumſtance this gas has obtained its name. After the above compendious ſtatement of the nature and properties of the gaſes which produce the damps, we may proceed to deſcribe the phenomena.

Two ſorts of damps have been principally deſcribed: one has been called the *choke-damp*, from its ſuffocating quality; the other has been called the *fire-damp*, from its diſpoſition to take fire, and to burn either gently, or with an exploſion.

The choke-damps generally occur in old mines, called *waſtes* by the miners; being ſuch as formerly had been worked, but afterwards remained neglected. Theſe damps are likewiſe frequently met with in old wells, deep cellars, and other ſubterranean places wherein the air has long remained undiſturbed. They are formed by an accumulation of carbonic acid gas, which iſſues from the ground, and being much heavier than common air, remains next to the bottom, or ground, in a ſtratum of various depth, and more or leſs mixed with common air, or with azotic gas. The effects which have been produced by this ſort of damp are more than ſufficient to manifeſt the nature of the gas to which it is owing.

The perſons who happen to deſcend within this damp, inſtantly loſe their reſpiration, and fall down ſenſeleſs; nor can their death be prevented, unleſs they are quickly removed into the open atmoſpherical air; but even this method frequently proves ineffectual. Several caſes are recorded, where one perſon having been ſuffocated, a ſecond went down with a view to ſave him; but he alſo fell, and ſometimes even a third perſon met with the ſame fate. Perſons that have thus loſt their lives, on examination, have been found to exhibit all the marks of animals that have been ſuffocated in carbonic acid gas. One of the ſureſt methods of aſcertaining the preſence of this kind of damp in a well, mine, &c. is to ſend down a lighted candle; for if the candle continues to burn, you may conclude that a human being is perfectly ſafe in it; but if the candle goes out, then

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the preſence of the damp may be conſidered as certain; yet the human being may breathe, though not with perfect freedom, in air ſo far vitiated as not to be capable of ſupporting combuſtion. The miners diſtinguiſh this laſt ſtate of the air from that which is completely noxious, by the appearance of the candle; *viz.* if the flame and the redneſs or coaly part of the wick vaniſh at the ſame time, they conclude that the air is utterly unfit for reſpiration; but if the redneſs of the wick continues ſometime longer after the extinction of the flame, then they think it not very dangerous to deſcend into the place.

On account of the ſuperior gravity of the carbonic acid gas, and of its affinity to water, a greater quantity of vapour frequently remains ſuſpended in the choke-damp, than in common air; hence this damp is ſometimes viſible like a fog or miſt, and this is particularly the caſe in a cavern near Pyrmont.

It frequently happens that the ſtratum of carbonic acid gas is not higher than two or three feet; ſo that a man will be perfectly ſafe in it as long as he remains in a ſtanding poſition; but ſhould he attempt to lie down or to ſit, he would run the riſk of being ſuffocated.

The ſudden iſſue of this damp out of the earth, eſpecially when any digging has been performed, has ſometimes inſtantly killed the workmen.

In all ſuch caſes, ventilation (in whatever manner it may be practiſed) is the beſt method of diſſipating the damp. But ſhould a man be obliged to go down into a place thus infected, either for the purpoſe of ſaving another man, or for ſome other particular purpoſe, he would do well to fill a bladder with common air, and by means of a ſhort tube faſtened to the neck of the bladder, and held in his mouth, to breath that air; for a bladder thus filled will laſt him ſome minutes, during which time a great deal might be done. He might alſo take with him two or more bladders filled with common air, and furniſhed with ſtop-cocks, or merely with tubes ſtopped with corks.

Cautious miners ought always to have ſuch bladders, or ſuch like bags, filled with common air, by them; for they coſt little or nothing, and will effectually ſave their lives occaſionally.

When digging is to be performed in any place where the leaſt ſuſpicion of a ſudden iſſue of the choke-damp is entertained, it will be proper to keep a candle or lamp burning cloſe to the ground; for if any noxious gas happens to come forth, the going out of the flame will afford ſufficient warning to the workmen.

The ſudden iſſue of the choke-damp from the earth frequently occurs in the neigbourhood of volcanoes, upon old lavas, and old accumulation of aſhes or other volcanic productions. Numerous caſes of this ſort take place in the vicinity of mount Veſuvius, in Naples, where the noxious vapours, (called *mofete* by the inhabitants,) ſuddenly enter houſes, cellars, &c. to the great annoyance of the inhabitants, who, as well as other animals, are ſometimes killed by them. See ſir William Hamilton's various accounts of the mount Veſuvius and its eruptions, in the Philoſophical Tranſactions, for 30 or 40 years paſt. Some of the ſcientific perſons of the above-mentioned country have occaſionally endeavoured to aſcertain the nature of the gas which produces thoſe mofete; and from their experiments it appears, that the greateſt part of the gas is carbonic acid, but more or leſs mixed with azotic gas, and frequently accompanied with ſulphureous and arſenical vapours. A remarkable inſtance of a continual ſtream of carbonic acid gas iſſuing from the earth, occurs near the city of Naples. At about five or ſix miles from that city, near the foot of a hill, there is a famous cave called *grotta del cane* in the Italian language. This grotto is about fourteen feet long, and nearly ſeven feet high at the entrance. On the bottom of it, which is nearly on the ſame level with the adjacent external ground, there is at all times a ſtratum of carbonic acid gas or choke-damp, which is continually coming out of the earth, through the fiſſures which are pretty apparent on the ground; and where the production of ſuch gas has been remarked from time immemorial. Animals of different ſpecies, as well as human beings who ſheltered themſelves in this grotto, were at times found dead in it, in conſequence of which a door was placed to the aperture of it, which is now only opened occaſionally. The experiments uſually ſhewn to the curious who viſit this grotto, are, that of bringing a lighted torch or lighted piece of paper near the bottom or floor; the flame of which is extinguiſhed as ſoon as it comes within about 14 inches of the ground; and ſecondly that of confining a dog with its head cloſe to the ground for about a minute. The reſpiration of the animal is inſtantly affected, and its ſtrength fails, ſo as to remain apparently dead; but on being expoſed to the ambient air out of the grotto, if it be not too far gone, the poor animal will gradually recover its reſpiration and its ſtrength. It is from this uſual experiment that this grotto has obtained its name: *cane* being the Italian for a dog.

Joannes Caramuelis, in his Matheſis Nova, printed in the year 1670, relates ſome experiments made by himſelf and others upon the noxious elaſtic fluid of this grotto, which are very remarkable, conſidering the time in which they were made. He obſerves, that the ſmoke of a candle, extinguiſhed near the bottom of this grotto, is entirely retained within the ſtratum of gas; and that if part of that ſmoke happened to be driven out of the grotto, it deſcended like water falling from the edge of a tub. Had he been acquainted with the nature of carbonic acid gas, he would have eaſily underſtood that the ſmoke was retained on account of the great attraction between that gas and the aqueous particles; and that it deſcended, when driven out of the grotto, on account of the great ſpecific gravity of the carbonic acid gas with which it was combined. The ſame ingenious perſon relates another experiment, which tends to prove the acid quality of the gas concerned, which quality has long after been fully aſcertained. He and his companions placed the head of an alembic on the bottom of the grotto; and as this inſtrument was colder than the air of the grotto, which generally is pretty warm, it collected a few drops of a watery fluid, which, to the taſte of his companions, ſeemed to be acidulous. In the preſent ſtate of knowledge this experiment is eaſily explained; it being evident that the head of the alembic condenſed the watery particles from the air of the grotto, and theſe became acidulous in conſequence of their becoming impregnated with the carbonic acid gas. The ground in the neighbourhood of grotto del cane ſhews manifeſt ſigns of ſubterranean fires or fermentation, as it abounds with ſulphur, hot ſprings, emanations of ſmoke, &c.

Fire-damp, though conſiderably heavier than pure hydrogen gas, is yet much lighter than atmoſpheric air. Hence where a tolerable ventilation is kept up, it ſeldom accumulates to a dangerous amount in the ſhafts, or vertical pits, that are open to the air; but in the horizontal galleries, where it occupies the upper part, forming a ſtratum, lying immediately in contact with the roof. It generally makes its firſt appearance in the cracks and crevices of the coal,

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particularly where it is moift and abounding in pyrites. While it is thus oozing out, it often burns with a quiet light blue lambent flame, which, on the contact of a candle, explodes with a hiffing noife, and, for a time, is extinguifhed or forced into an adjacent crevice. In proportion as the water is drained off, the production of this gas diminifhes, fo that the dryeft mines are the leaft infefted with it. Heat contributes much to its generation; hence it is generally more abundant during the fummer than the winter months. If it is not cleared out of the mine, in proportion as it is produced, it foon begins to accumulate in the upper part of the galleries, on which account it is a caution well worth remembering, by thofe who vifit a coal-pit, to hold their candles as low down as poffible. The gas thus continues to increafe without producing any material inconvenience to the miners, till, at length, it comes in contact with fome lighted candle: the flame is immediately increafed to five or fix times its ufual fize, and in a fecond or two afterwards, the whole body of gas takes fire: a volume of flame and black fmoke darts from the gallery into the vertical fhafts, whence it rifes into the air with a loud ftunning explofion, throwing up, to a confiderable height, men, large beams of timber, and every thing elfe that happens to be in its way. As foon as the explofion has taken place, the external air rufhes violently into the mine to fill up the vacuum, and the refidual inflammable gas again takes fire, and burns quietly for a few minutes, till it is extinguifhed.

When an accident of this kind happens, there are three diftinct dangers to which the miners within its influence are expofed. In the firft place, thofe who are in the gallery where the inflammation commences are fcorched by the fire, and are alfo liable to fuffer feverely from the rufhing in of the air to fupply the vacuum caufed by the explofion. Secondly, thofe who happen to be in the fhaft, or near the mouth of the gallery, are either blown up out of the pit, or are killed by being violently forced againft its fides. In the latter of thefe fituations there is no poffibility of efcape; but thofe who are not exploded, often fave their lives by throwing themfelves on their faces on the ground, and covering themfelves, as well as they can, with fmall coal, &c. till the danger is paft. No particular odour is perceivable before the inflammation, but afterwards a ftrong and fuffocating fmell of burning fulphur becomes very obvious.

We fhall now give a fummary of the facts that were collected from the miners by Mr. Jeffop, as given in the Philofophical Tranfactions, N° 119.

1. "Thofe who are in the place where the vapour is fired, fuddenly find themfelves furrounded with flames, but hear little or no noife; though thofe who are in places adjacent, or above ground, hear a very great one. 2. Thofe who are furrounded by the inflamed vapour feel themfelves fcorched or burnt, but are not moved out of their places; though fuch as unhappily ftand in the way of it, are commonly killed by the violence of the fhock, and are often thrown with great force out of the mouth of the pit; nor are the heavieft machines found able to refift the impetuofity of the blaft. 3. No fmell is perceived before the fire, but a very ftrong one of brimftone is afterwards felt. 4. The vapour lies towards the roof, and is not perceived if the candles are held low; but when thefe are held higher, the damp defcends like a black mift, and catches hold of the flame, lengthening it to two or three hands full; and this appearance ceafes when the candles are held nearer the ground. 5. The flame continues in the vault for feveral minutes after the crack. 6. Its colour is blue, fomething inclining to green, and very bright. 7. On the explofion of the vapour, a dark fmoke, like that produced from firing gun-powder, is perceived. 8. Damps are generally obferved to come about the latter end of May, and to continue during the heat of fummer. They return feveral times during the fummer feafon, but obferve no certain rule."

The fire-damps generally occur in coal-mines; and in the Philofophical Tranfactions, N° 136, we find feveral accounts and obfervations made in digging fuch mines; and from thefe we fhall compendioufly extract the moft ufeful particulars.

"After they had gone, the account fays, a confiderable way under ground, and were fcanted of wind, the fire-damps did begin by little and little to breed, and to appear in crevices and flits of the coal where water had been before the opening of the coal, with a fmall blueifh flame, working and moving continually; but not out of its firft feat, unlefs the workmen held their candles to it; and then being weak, the blaze of the candle would drive it with a fudden fiz away to another crevice, where it would foon after appear blazing and moving as formerly.

"This mine was neglected for a certain time; and upon a morning, the firft collier that went down with his candle in his hand, the damp prefently darted out fo violently at his candle, that it ftruck the man quite down, finged his hair and clothes, and difabled him for a while. After the ceffation of work for fome days, in going down the firft time, the fire-damps have often exploded with terrible effects."

The bad effects of the fire-damps may, in a great meafure, if not entirely, be prevented by vigilance, and by a proper conformation of the excavations. In digging a mine, due attention ought to be paid to the roof of it, which ought to be fhaped fo as in fome meafure to refemble an inverted funnel, *viz.* having the higheft part of it near to the fhaft or fhank; for, by this means, the hydrogen gas, or fire-damp, would afcend into the atmofphere as foon as it is generated; nor could it be lodged any where in fo great a quantity as to produce any dangerous effects. In mines already formed, and efpecially when they have not been worked for a certain time, it is always proper to let down two or three lighted candles by means of a rope; and if thefe produce no inflammation, then a man with a candle ought to be fent down, who, after advancing a few fteps into the mine, ought to lay himfelf down, and ought to lift up a lighted candle on the top of a pole as high as he can; for the inflammable gas which always occupies the upper part of the mine, may, in that cafe, be exploded with hardly any danger to the man.

When miners are actually working in a mine, the accumulation of the inflammable gas may be eafily prevented, *viz.* by firing it off immediately as it iffues out of the various crevices.

Ventilation is the beft method of removing damps out of mines, and at the fame time of giving wholefome air to the labourers; but this is hardly practicable in fuch mines as are furnifhed with one fhaft or aperture. It is, therefore, always to be wifhed that mines of any extent fhould be furnifhed with two or more fhafts in proportion to their extent. The ventilation then may be promoted by lighting a fire under one of thofe fhafts; for by this means the air of that fhaft being rarefied, will be forced to afcend, and of confequence an influx of pure atmofpherical air will enter the mine through the other fhaft or fhafts. Several mechanical methods have alfo been ufed for the ventilation of mines. The nature of the gas which produces the fire-damp, as well as that which produces the choke-damp, has been fre-

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quently fubjected to philofophical experiments, with a view to afcertain both its origin and its qualities. Sir James Lowther collected the gas of the fire-damps in bladders, and thus brought it up to London, where, upon trial, he found, that on being let out of the bladders, it would take fire at the flame of a candle. But fome recent experiments of Dr. William Henry, on a fimilar fort of gas, were performed with greater care; and their refults, which we fhall fubjoin, are much more fatisfactory.

"About the clofe, Dr. Henry fays, of 1806, I received from the Rev. W. Turner of Newcaftle-on-Tyne, two bladders filled with the fire-damp, which had been procured from a coal-mine in the neighbourhood of that town. It was caught by luting a common funnel over the mouth of a *blower* (*viz.* one of thofe holes or crevices in the coal, from which the fire-damp iffues, fometimes with confiderable force,) and tying a compreffed bladder on the pipe of the funnel, after the gas had iffued from it for fome time. My experiments were made on the gas, about feven days after its being firft collected. At that time the bladders were perfectly dry, and fhewed no figns of putrefaction."

The general refults of thefe experiments, (as ftated in a memoir which was read in January 1807, before the Medical Society of Edinburgh,) are the following. The gas was found, by the teft of nitric oxyd, ufed in Mr. Dalton's method, to contain about $\frac{2}{3}$ its bulk of common air. It had a difagreeable fmell. When fet on fire, as it iffued from the orifice of a fmall pipe, it burned with a dark blue flame; and a long conical glafs veffel, held over the flame, was foon bedewed with moifture. Mixed with common air, it did not detonate on the approach of a lighted taper, at leaft in any proportion that was tried. The utmoft effect was a deep blue flame, which fpread quickly through the veffel, but was not accompanied with any noife. With oxygen gas, however, it exploded, and gave a loud report. On agitation with lime water, it loft about $\frac{1}{60}$th of its bulk. The niceft tefts did not difcover any admixture of fulphurated hydrogen. One hundred parts by meafure appeared, therefore, to confift of

63.34	atmofpherical air
1.66	carbonic acid
35.00	inflammable gas
100.00	

"The nature of the inflammable gas was next afcertained by detonation with oxygen gas. Reducing the refults to a general average, and excluding the common air, the really inflammable part of the gas required for combuftion about twice its bulk of oxygen; and gave its own volume of carbonic acid. Hence the inflammable portion of the gas was *carburetted hydrogen*. From the experiments of Mr. Dalton on the gas from ftagnant water, and my own obtained by diftilling pit-coal, the fire-damp appears to differ very little from both thefe gaffes.

"It was defirable, however, to repeat the analyfis of fire-damp, lefs adulterated with common air; and for this purpofe a quantity was collected (as it iffued through water on the floor of a mine) in an inverted bottle, which was well corked, and tied over with a bladder. Happening to pafs through Newcaftle laft fpring, I carried this gas with me to Edinburgh; and, having no opportunity of making experiments upon it there, my friend Dr. Thomfon was fo good as to undertake its analyfis, and to furnifh me with the following refults.

"From the action of nitrous gas and lime-water, the gas appeared by Dr. Thomfon's experiments, to contain in 100 meafures,

63.0	inflammable gas
6.5	oxygen
25.5	azote
5.0	carbonic acid
100.0."	

Notwithftanding all the above-mentioned facts, experiments, and obfervations, the real origin of the gaffes which produce the damps is by no means thoroughly underftood. Indeed the origin of the carbonic acid which produces the choke-damp may pretty well be accounted for, confidering the immenfe quantity of that gas which is combined with calcareous ftones and other minerals; alfo that the action of heat eafily extricates that gas from the above-mentioned minerals; fo that whenever any fermentation, or any heat arifing from various caufes, happens to act upon fuch minerals, the extrication of carbonic acid is a natural confequence. But the origin of the hydrogen gas is not equally clear. It was formerly a prevailing opinion, that the inflammable gas was furnifhed by the decompofition of water on ftrata of pyrites, efpecially thofe of a martial nature; confidering that the folution of iron, and of pyrites itfelf, in various menftrua, produces abundance of that gas. But if the hydrogen were produced by the action of pyrites upon water, a quantity of fulphur would be naturally contained in the gas, which does not appear to be the cafe from the above-mentioned experiments of Drs. Henry and Thomfon, who exprefsly mention their not having found any fulphuretted hydrogen in the fire-damp which they examined.

If we confider the various fucceffive ftrata of different materials which almoft every excavation, and efpecially coal and metallic mines, exhibit to our view, a much more rational mode of accounting for the production of the inflammable gas perhaps would be, by attributing the decompofition of water, and the confequent extrication of the gas, to the agency of electricity, agreeably to the phenomena of that branch of it which is at prefent moft advantageoufly cultivated under the name of *Galvanic* ELECTRICITY; which fee.

Having thus ftated every thing which feemed to be of importance with refpect to the damps, which have infefted from time immemorial, and do actually continue to infeft mines of almoft every kind; we fhall clofe this article with a fhort account of two other, much lefs authentic, or much lefs known, kinds of damp. The account (which is contained in the Philofophical Tranfactions, as given by the fame Mr. Jeffop, whom we mentioned above) is as follows:

"They call the third fort the *peafe-bloom damp*, becaufe, as they fay, it fmells like peafe-bloom. They tell me it always comes in the fummer-time; and thofe grooves are not free which are never troubled with any other fort of damps. I never heard that it was mortal; the fcent, perhaps, freeing them from the danger of a furprife; but by reafon of it many good grooves lie idle at the beft and moft profitable time of the year, when the fubterraneous waters are the loweft. They fancy it proceeds from the multitude of red-trefoil flowers, by them called *honey-fuckles*, with which the lime-ftone meadows in the Peak do much abound. The fourth damp is the ftrangeft and moft peftilential of any, if all be true which is faid concerning it. Thofe who pretend to have feen it (for it is vifible) defcribe it thus. In the higheft part of the roof of thofe paffages which branch out

out from the main groove, they often fee a round thing hanging, about the bignefs of a foot-ball, covered with a fkin of the thicknefs and colour of a cob-web. This, they fay, if it is broke by any accident, as the fplinter of a ftone, or the like, difperfeth itfelf immediately, and fuffocates all the company. Therefore, to prevent cafualties, as foon as they have efpied it, they have a way, by the help of a ftick and long rope, of breaking it at a diftance; which done, they purify the place well with fire, before they dare enter it again. I dare not avouch the truth of this ftory in all its circumftances, becaufe the proof of it is impoffible, fince they fay it kills all that are likely to bear witnefs to the particulars; neither do I deny but fuch a thing may have been feen hanging on the roof, fince I have heard many affirm it."

DAMPIER, William, in *Biography*, an eminent navigator, was defcended from a refpectable family in Somerfetfhire. He was born in the year 1652. Having the misfortune to lofe his parents early, he was bound apprentice to the captain of a Newfoundland trader, at the age of 17. His firft voyage was to France; and in the following year he went to Newfoundland. The feverity of the climate, and the attendant hardfhips of the voyage, made him almoft refolve that he would abandon for ever the difficulties of a maritime life. An opportunity, however, foon offering itfelf, he went out as common failor to the Eaft Indies. In this fituation he made a voyage to Bantam, and was fully fatisfied with the experience which he obtained by the event. In 1673 he ferved in the Dutch war, under fir Edward Sprague, and was in two engagements. Sicknefs obliged him to land, and he fpent fome months with his brother; after which he went to Jamaica, as under manager in a plantation. From the Weft Indies he went to Campeachy, and engaged with the logwood-cutters as a common workman. When he was tired of this bufinefs he returned to Jamaica, and thence to England. In 1679 he failed again for the Weft Indies, meaning alfo to revifit Campeachy; but he was perfuaded to join fome pirates of different nations, who plundered any people over whom they could take advantage. With thefe Dampier croffed the ifthmus of Darien in 1680, and fpent that year in roving about the Peruvian coaft, making attempts upon the feveral towns, fome of which proved fuccefsful, and in others they were repulfed with confiderable lofs. In 1681 he recroffed the ifthmus, and joined another fleet of thefe pirates which was cruifing on the Spanifh main: thefe purfued the fame bufinefs, being prepared for any mode of acquiring gain that might offer. In one inftance they took three veffels with 1000 negroes on board; thefe Dampier would have taken and employed in the goldmines, but his fellow-adventurers overruled the project. His next attempt was to capture the rich plate fleet which was conveying the treafure of Peru to Panama; but in this they were difappointed. In this predatory courfe Dampier continued till 1688, when he perfuaded his captain to leave him at Nicobar, where he thought, by conforming to the manners of the natives, and learning their language, he might be able to carry on an advantageous trade in ambergris. With him feven others were fet on fhore. They attempted to navigate a fmall-boat to Achin in Sumatra. At firft every thing feemed favourable to the project. On the fourth day, when they had made but fmall progrefs in their voyage, the wind rofe, the heavens lowered, and every appearance feemed to threaten them with an inextricable and overwhelming danger. They agreed to furl their fails, and give themfelves to the fury of the element, which they had no means to avoid, nor power to contend with. Preparations being made, they waited the impending ftorm with anxious and gloomy apprehenfions. The event was more tremendous than they had even anticipated. The fea ran mountains high, and breaking over their canoe, every moment threatened to overwhelm her in the deep. Dreadful as the fituation was by day, it feemed ftill more terrible as the darknefs approached. All the dangers to which Dampier had been expofed, were not to be compared to this: "The fky," fays he, "looked very black, being wrapped in fable clouds; the wind blew hard, and the fea was lafhed into foam around us. A dark night was coming on, and no land to fhelter us, and our little bark in danger of being fwallowed up by every wave. What gave a deeper tinge to our diftrefs, was the reflection, that none of us were prepared to enter on another ftate of exiftence with the confidence of hope. I had encountered many imminent dangers before this; but compared with the prefent, the worft of them was only a play-game. I muft confefs that I was in great perturbation of mind: other diftreffes came out upon me with fuch dreadful folemnity. A fudden fkirmifh or engagement was nothing, when the blood was warm, and invigorated the heart by the glow of expectation; but here I had a lingering view of impending fate, with little or no hopes of avoiding it. My courage, which had hitherto kept me up, now failed me; and I made very fad reflections on my former life, and looked back with horror and deteftation on actions which before I could not relifh, but at the remembrance of which I now trembled. I had long repented of my roving life; but never with fuch fincere contrition before." The whole of their fufferings is defcribed by Dampier with admirable force; neverthelefs, they furmounted them all, and landed fafely at Sumatra. Long continued ficknefs was, however, the confequence of their want of reft, and of neceffary food, from the effects of which fome of the party never recovered. Dampier himfelf was not free from the attendant complaints for a twelvemonth and more. After this he made feveral voyages to Tonquin, Malacca, and other parts of the Eaft Indies. In 1691 he returned home, having completed the circumnavigation of the globe. As his property, he brought home a native of one of the fpice iflands, who was the fon of an Indian chief, and was called here the Painted Prince, on account of his being fo curioufly tattowed. This youth was purchafed in the way of trade, was fhewn in England as a ftrange fight, and at length died of the fmall-pox at Oxford. We know nothing of the manner in which Dampier fpent his time during the next feven or eight years; but in 1699 he was appointed to the command of the Roebuck, a floop of twelve guns, with fifty men. He failed firft for the Brazils, and thence he made to the weftern coaft of New Holland, where he arrived on the firft of Auguft. He next failed to Timor, and thence to the coaft of New Guinea. This he found terminated by an ifland, which he failed round, and named New Britain. He returned to Timor in May, and proceeding by the Cape of Good Hope, arrived off the ifle of Afcenfion, in February 1701. Here his veffel became leaky, and foundered; but he and his crew reached the ifland, where they remained till they were brought away by an Eaft India fhip. He afterwards accompanied captain Woodes Rogers in a voyage round the world. The time of Dampier's death is not known. The account of his voyages has been very frequently reprinted; and the fubftance of them has been incorporated in a hundred different compilations. His own volumes contain many curious, valuable, and important obfervations, in a plain but manly ftyle, and bearing all the marks of fidelity. His remarks difplay much nautical, and fome philofophical knowledge.

A portrait

A portrait of Dampier is preferved in the Trinity Houfe. Dampier's Voyages.

Dampier's *Straits*, in *Geography*, lie between the N.E. point of New Guinea, and the S.W. point of New Britain; S. lat. 6° 15'. E. long. from Paris 146°.

DAMPIERRE, a fmall town of France, in the department of the Upper Saône, chief place of a canton, in the diftrict of Gray. It has 1344 and the canton 12,123 inhabitants, difperfed in 33 communes upon a territorial extent of 255 kiliometres.—Alfo, a fmall town of France, in the department of the Jura, diftrict of Dôle, with a population of 465 individuals, and chief place of a canton which, in 15 communes and upon 127½ kiliometres, contains 5905 inhabitants.—Alfo, a fmall town of France, in the department of the Lower Charente, 9 miles N. of Saint Jean d'Angely.—Alfo, a fmall town of France, in the department of the Côte d'or, 18 miles N.E. of Dijon.—Alfo, a fmall town of France, with a fine caftle, in the department of Seine and Oife, 3 miles W. of Chevreufe.

DAMRABAD, a town of Perfia, in the province of Segeftan; 180 miles S.W. of Zareng.

DAMSEE, a lake of Germany, in the circle of Upper Saxony, and Ucker Mark of Brandenburg; 9 miles N.W. of Prenzlow.

DAMSEL, Damoisel, or Damoiseau, an appellation anciently given to all young people of genteel or noble extraction of either fex, *e. gr.* to the fons and daughters of knights, barons, and even of kings.

Thus, in hiftory, we read of the damfel Pepin, damfel Louis le Gros, damfel Richard, prince of Wales.

Pafquier will have the word a diminutive of dam, an ancient name for lord; as in fome authors we read Dam Dieu for lord God; dam chevalier, &c. Though in its feminine fenfe he takes it to come from dame.—Others derive the word from domicellus, or *domnicellus*, a diminutive of domnus, quafi parvus dominus: accordingly, Du Cange obferves, that it has been fometimes written domenger.

They who hold the fignory of Commercy, M. de la Roque tells us, anciently held it in the title of damoifeau: and M. de Marca affures us, that the nobleffe of Bern is ftill divided into three bodies, or claffes; the barons, the cavers, and the damfels, domicellos, called in that country domengers.

The kings of Denmark and Sweden have the fame title, as appears from Pontanus's Hift. of Denmark. lib. vii. and viii. and Henry of Upfal's Hift. of Suec. lib. iii.

From the fons of kings, the appellation paffed to thofe of great lords and barons; and, at length, to thofe of gentlemen who were not yet knights.

Damsel, at prefent, is applied to all maids, or girls, not yet married; provided they be not of the loweft clafs of people.

Damsel is fometimes alfo applied to a kind of utenfil put in beds, to warm old men's feet.

It confifts of a hot iron inclofed in a hollow cylinder, which is wrapped round with linen cloth, and keeps its warmth a long time. Some call it a nun.

DAMSON Tree, in *Botany*. See Chrysophyllum and Prunus.

Damsons. See Prunes.

DAMSONG, in *Geography*, a town of Afia, in the country of Bootan; 54 miles S.W. of Taffafudon. N. lat. 27° 11'. E. long. 88° 24'.

DAMSTER, a river of Germany, which runs into the Ems at Delfzyl.

DAMVILLE, a fmall town of France, in the department of the Eure, in the diftrict of Evreux; 12 miles S. of Evreux, famous for its good cyder. It has 720 inhabitants, and is the chief place of a canton, which reckons a population of 7187 individuals, and 27 communes, upon a territorial extent of 190 kiliometres.

DAMVILLERS, or Damvilliers, a fmall town of France, in the department of the Meufe, and chief place of a canton, in the diftrict of Montmedy; 18 miles N.E. of Verdun, and 36 S.W. of Luxembourg. N. lat. 49° 22'. It has 809 inhabitants, and the canton contains a population of 9117 individuals, and 24 communes, upon a territorial extent of 240 kiliometres. Damvillers had been fortified by Charles V. in 1528; but having been ceded to France at the peace of the Pyrenées, Louis XIV. demolifhed its fortifications in 1673.

DAN, *Tribe of*, in *Ancient Geography*, lay S.W. of the tribe of Judah, between it and the Mediterranean, contiguous to that of Simeon. It was bounded on the N. by Ephraim, on the W. by the Philiftines and the Mediterranean, on the S. by Simeon, and on the E. by Judah and Benjamin. Its greateft length, from north to fouth, did not exceed 40 miles; on the north fide it was very narrow, and not above 25 broad on the fouth. Its foil was fertile, and its inhabitants induftrious and brave; fome of them, difdaining confinement within their own limits, advanced, fo far as the city of Laifh, in the utmoft verge north of Paleftine, after new fettlements. The country abounded with corn, wine, oil, fruits, and all other neceffaries. In this diftrict was the valley called Nahal Efcol, &c. of the grapes; whence, the fpies fent by Mofes brought excellent fpecimens of its fertility to the camp of the Ifraelites. Dan had within its fmall extent feveral cities of note; the chief of which were Joppa, Jamnia, Cafphin, Thimnah, Beth-Shemefh, Ajalon, Lachifh, Modin, Eltek, Laki, Gibbethen, and Zora or Sora.

Dan, a city in the northern part of Paleftine, in the tribe of Naphtali, which had formerly been called Laifh or Lathem; but being taken by a colony of Danites, they gave it the name of their own tribe. This city became infamous for the calf fet up by Jeroboam, which was reforted to by all the revolted tribes on this fide; and as it ftood on the utmoft verge of Judæa, as Beer-fheba did on the oppofite; this circumftance gave rife to the common proverb, "from Dan to Beer-fheba." When the Romans took it, they gave it the name of Paneas, and beftowed it on Philip, the fon of Herod, who called it Cæfarea Philippi. But fome writers place Dan at the foot of mount Libanus, on the banks of the Jordan, at the diftance of 4 miles from Paneas, on the fide of Tyre.

Dan, *Camp of*, lay in Paleftine, between Saraa and Eftahol, in the tribe of Dan. In this camp Sampfon was interred.

Dan, in *Geography*, a confiderable river of America, in North Carolina, which unites with the Staunton, and forms the Roanoke. The famous Burfted hill is fituated on the bank of the Dan in Virginia, near the borders of N. Carolina. This hill appears to have been an ancient volcano, as large rocks of lava, of great weight, lie on its fummit, and the crater is partly filled and covered with large trees. N. lat. 36° 34'. W. long. 78° 50'.

DANA, a new town of America, in the ftate of Maffachufetts, and county of Worcefter, formed from the corners of Greenwich, in the county of Hampfhire, and Hardwick and Peterfham, in Worcefter county.

Dana, or *Dagana*, in *Ancient Geography*, a maritime town of Afia, in the ifland of Taprobana, according to Ptolemy; who adds, that it was dedicated to the moon.—Alfo, a large, rich,

rich, and populous town of Cappadocia, where Cyrus sojourned three days.

DANABA, a town of Asia, in Syria, placed by Ptolemy in the Palmyrene territory, S.W. of Palmyra.

DANÆ, or DANATI, a town of Asia, in the Pontus Polemoniacus, situated near the springs of the river Iris, in the 41st degree of latitude, according to Ptolemy.

DANAE, or *Danace*, δανάκη, or δανακη, in *Antiquity*, a coin current among the barbarians, being somewhat more than the obolus. This they put into the mouths of dead people, to pay for their passage over the river Acheron.

DANAE, in *Fabulous History*, the only daughter of Acrisius, who, having learnt from the oracle, that his grandson would bereave him of his crown and life, shut her up in a brazen tower, and would give ear to no proposal of marriage for her. In the mean time, Prætus, his brother, being desperately in love with his niece, corrupted the fidelity of her keepers by means of money, and having obtained access to her, she became the mother of Perseus. This fable is comprehended by Ovid in a single line (Met. l. vi); "Persea quam pluvio Danaé conceperat auro." Horace has given it a moral application, in order to demonstrate the power of gold over mankind:

> "Aurum per medios ire satellites
> Novit, &c."

In order to palliate the disgrace of this intrigue, it was given out, that Jupiter, enamoured of Danae, had transformed himself into a shower of gold; but it was more probable, that Prætus, if we may believe Vossius, (De Orig. et Progr. Idol. l. i.) took upon him the surname of Jupiter. Pausanias (in Corinth.) mentions the tower, or rather apartment of brass, in which Danae had been shut up, and assures us, that it subsisted till the time of Perilaus, the tyrant of Argos, who demolished it; adding, that even in his time, some remains of the subterraneous palace, containing Danae's chamber, were to be seen. Danae, being delivered of Perseus, was exposed, by Acrisius, with her son, to the dangers of the sea, but, at length, hospitably received by the king of Seriphus, one of the Cyclades islands, who educated young Perseus. After several adventures, Perseus went with his mother into Greece, dispossessed Prætus of his territories, and re-established his grandfather, Acrisius, who had been dethroned, in his dominions; but as he was endeavouring to shew his dexterity in playing at quoits, he flung his quoit by accident at Acrisius and slew him. Pausan. in Corinth.

DANÆA, in *Botany*, a most curious genus of dorsiferous ferns, was first separated by Dr. Smith from the *Asplenium* of Linnæus, to which it has as little affinity as any two plants of the same natural order can have to each other, and was named by him in honour of his friend professor Dana of Turin, the pupil and successor of the celebrated Allioni, who had already dedicated a plant to Mr. Dana, which proves to be no other than *Ligusticum cornubiense*. Sm. in Mem. de l'Acad. de Turin, v. 5. 420, t. 9. f. 11. Tracts, 260, t. 1. f. 11. Swartz, Filic. 167. Class and order, *cryptogamia filices*; sect. *Exannulatæ*. Nat. Ord. *Filices dorsiferæ*

Ess. Ch. *Capsules* of one cell, bursting by a pore at the summit, accumulated together in two parallel rows.

A double row of crowded capsules is arranged along each vein of the fructifying leaflets, forming all together an oblong, turgid somewhat cylindrical body, perforated with two rows of pores along its upper surface, which are the orifices of the capsules. These are not, as Dr. Swartz supposed, always open, but continue closed till the seeds are ripe, which are extremely minute and abundant, resembling the finest dust. The same great cryptogamist errs, as we presume to think, in considering these rows or congeries of capsules as single capsules of many cells. That the idea we have given of them above, not without much consideration, is most correct, appears from their perfectly indeterminate number of these little capsules, which is limited chiefly by the shape or dimensions of the leaf, and the rows being sometimes, though rarely, from accidental circumstances, interrupted.

Sp. 1. D. *nodosa*. Sm. Tracts, 260. Swartz Fil. 167. Cavan. Leccion. 281. (Asplenium nodosum; Linn. Sp. Pl. 1539. Lingua cervina nodosa major. Plum. Fil. 90. t. 108.) Stalk scarcely winged; leaflets linear-oblong, sessile, pointed, nearly entire, covered with capsules to the edge. Radical scales acute. A native of Martinico and Hispaniola, in damp shady woods near rivers, according to Plumier who first described it. It is a large and handsome fern. *Root* creeping, thick and knotty, producing two alternate rows of *fronds*, accompanied at their base with acute undivided scales. Each *frond* is about four feet high, simply pinnate. The *stalk* smoothish, juicy, knotty, cylindrical with a channel in front, scarcely if at all winged, even in the upper part. *Leaflets* opposite from each knot, sessile, six or eight inches long, oblong, almost linear, entire, wavy, with a taper point, smooth on both sides, with one rib, and innumerable, fine, straight, transverse, parallel veins, mostly in pairs. *Capsules* closely covering the leaflets of some smaller fronds, from whose veins they originate, of a lightish brown when ripe, each row extending from the main rib very nearly to the margin, with rudiments of a membranous partition between the rows.

2. D. *elliptica*. (Filix major, in pinnas tantum divisa, raras, latiores, oblongas, striatas, ex adverso sitas, et non crenatas. Sloane Jamaic. v. 1. 85. t. 41. f. 1.) Stalk scarcely winged; leaflets elliptic-oblong, stalked, pointed, nearly entire, bare of fructification near the margin. Observed by Sloane in Jamaica, from whence the younger Linnæus obtained a specimen. The *fronds* are but half as tall as in the former, and their leaflets half as long, though somewhat broader and elliptical. The latter, moreover, stand on short partial footstalks. The rows of *capsules* scarcely extend so near to the edge of the leaflet on which they grow, but are more remarkably separated from each other, at least in a half-ripe state, by a double prominent undulated membrane. The frond in our specimen is clothed with minute *jungermanniæ*, evincing its moist and shady place of growth.

3. D. *alata*. Sm. Tracts, 261. Sw. Fil. 167. (Lingua cervina nodosa minor. Plum. Fil. 91. t. 109.) Stalk winged towards the top; leaflets serrated, bare of fructification near the margin. Radical scales obtuse and jagged. A native of Martinico. *Fronds* about two or three feet high, scaly. *Leaflets* numerous, from one to two inches long, on short stalks, oblong, crisped and serrated, scarcely pointed. Rows of *capsules* shorter and broader in proportion than in either of the former, with double, straight, intervening membranes, and not extending to the margins of the leaflets, sometimes by a considerable distance.

4. D. *simplicifolia*. Rudge Pl. Guian. 24. t. 36. Frond simple, elliptic-lanceolate, entire. Communicated by T. F. Forster, Esq. F.L.S., who received it from Guiana. This differs from all the rest in its simple *fronds*, which are six or eight inches long, lanceolate, inclining to elliptic, acute, entire, smooth, somewhat oblique, each standing on a reddish scaly *stalk*, above its own length. The fertile fronds are covered with crowded slender double lines of small *capsules*,

ſules, ſcarcely extending to the margin, with double broadiſh intervening membranes.

Perhaps theſe membranes are a true cover or *involucrum* in this genus. They do not originate from any vein, for each double row of capſules is inſerted into that part.

We have a fern from the iſland of St. Kitt's, with a winged ſtalk, and alternate crenate leaflets, whoſe whole aſpect declares its cloſe affinity to theſe *Danææ*, but without fructification we dare not aſſociate it with them. S.

DANAIDES, in the *Ancient Mythology*, the daughters of Danais, or Danaus, eleventh king of Argos, and brother of Ægyptus.

They were fifty in number, and were eſpouſed to the fifty ſons of their uncle Ægyptus.

Danaus fearing the accompliſhment of an oracle, which had foretold that he ſhould be expelled his kingdom by a ſon-in-law, perſuaded his daughters to murder, each of them, her huſband, the firſt night; which they performed, all but Hypermneſtra, who ſpared her huſband Lynceus.

In vengeance for this crime of the forty-nine Danaides, the poets have condemned them to hell, to be continually employed in filling a caſk perforated at bottom. Euſebius and ſome others ſuggeſt, that what had given riſe to this fiction was, that they had laboured in digging wells in Argos, where ſome of them had been continually employed in drawing water by pumps, which is a painful exerciſe: whence thoſe who were condemned to this labour took occaſion to ſay, that the gods, to puniſh theſe princeſſes, had ſentenced them in hell to fill a veſſel full of holes. The learned Bryant, conceiving that the words νηυς and ναυς are derived from Nau and Noah, obſerves, that the name of Danaus relates not to a man, but is in reality "da Näus," and ſignifies literally "the ſhip." The era of Danaus is, therefore, the era of the ſhip; being the preciſe time when ſome model of this ſacred veſſel was introduced, and the rites alſo and myſteries with which it was attended. The 50 daughters of Danaus were 50 prieſteſſes of the Argo, who bore the ſacred veſſel on feſtivals. In Egypt there was a temple, called Ca Nobus, erected to the god of ſeas; to whom the element of water in general was ſacred. Throughout the whole hiſtory of Danaus and his daughters, ſays Bryant, there will be found alluſions to the rites of this god. The Danaides are ſaid to have been ſent in queſt of water; to have brought water to Argos; to have invented ὑδρεια, or veſſels for water; and laſtly, they were ſuppoſed to have been doomed in the ſhades below to draw water in buckets, which were full of holes. Every circumſtance of this hiſtory, Mr. Bryant imagines, is deduced from Egypt. The natives of that country were very aſſiduous in conveying water from one place to another. They had likewiſe particular jars, which were ſacred to the god, whom the Greeks called Canobus; and were formed with a repreſentation of him. Theſe canobic veſſels were ſometimes made of porous ſtone; at other times of earth manufactured in ſuch a manner as to have ſmall holes in the bottom; through which they uſed to filter the water of the Nile, when it was either turbid or ſaline. This practice of filling veſſels which could not hold the water put into them, ſeemed ſuch a paradox to the Grecians, that when they came to conſign ſome of their prieſts and deities to the infernal manſions, they made this the particular puniſhment of the Danaides, on account of their cruelty. Anal. Anc. Mythol. vol. ii.

The Danaides are ſometimes alſo called Belides, from their father, who was the ſon of the Egyptian Belius. Hyginus has preſerved the names of forty-ſeven of them.

DANAPRIS, in *Ancient Geography*, a river of Sarmatia, the ſame with Boryſthenes.

DANARAKIE, in *Geography*, a town of Perſia, in the province of Irak; 60 miles E. of Iſpahan.

DANASLU, in *Ancient Geography*, a name given by Jornandes to a river of Sarmatia; the Tyras of the ancients, and the Nieſter or Dnieſter of the moderns. It is called Danaſtus by Ammianus Marcellinus.

DANATA, a name given by Ptolemy to a town of Serica, between Abrogana and Oroſana.

DANBURY, in *Geography*, a town of America, in the ſtate of New Hampſhire, and county of Grafton; containing 165 inhabitants.—Alſo, a poſt-town in the county of Fairfield, in Connecticut; ſettled in 1687, and containing 2 churches, a court-houſe, and about 60 dwelling-houſes. On its ſmall ſtreams are iron-works, and ſeveral mills. It lies about 70 miles N.E. of New York city, and 33 N.W. by W. of New Haven. It has 3180 inhabitants.

DANBY, a poſt-town in Rutland county, Vermont, E. of Pawlet, containing 1487 inhabitants; 32 miles N. of Bennington.

DANCALI, a ſmall kingdom of Africa, on the coaſt of the Red Sea, reaching to the frontiers of Abyſſinia. It is bounded on the eaſt at Azab, by part of the kingdom of Adel, and the Myrrh country. This is a low, ſandy diſtrict, lying on the Red Sea, juſt where the coaſt, after bearing a little to the eaſt of north from Suez to Dancali, makes an elbow, and ſtretches nearly eaſt, as far as the Straits of Babelmandel. It has the mines of foſſile-ſalt immediately on the N. and N. W., a deſert part of the province of Dawaro to the S., and the ſea on the N. It has no port, excepting a ſpacious bay, with tolerable anchorage, called "the bay of Bilur," in lat. 13° 3'. and corruptly, the bay of Bayloul. The king is a Mahometan, as are all his ſubjects, who are called "Taltal;" they are all black, and ſome of them woolly-headed; a circumſtance which ariſes from a mixture with the Abyſſinians, whoſe hair is long. There are only two ſmall rivers of freſh water in the whole kingdom; and theſe, in the hot ſeaſon, are not viſible above the ground, but are ſwallowed up in the ſand, ſo that they are to be dug for when water is wanted. In the rainy ſeaſon they are ſwollen by rain falling from the ſides of the mountains, and from the high lands of Abyſſinia, and then only run with a current into the ſea. The reſt of the water in the country is ſalt or brackiſh, and unfit for uſe. Whenever theſe fail, they are obliged to ſeek, far off in the rainy frontiers of Abyſſinia, water for themſelves, and paſture for their miſerable goats and ſheep. When the Indian trade flouriſhed, this prince's revenue aroſe chiefly from furniſhing camels for the tranſport of merchandize to all parts of Africa. Their commerce is now confined to the carrying of bricks of ſolid or foſſile-ſalt, dug from pits in their own country, which, in Abyſſinia, paſs inſtead of ſilver currency; theſe they deliver at the neareſt market in the high land, at a very moderate profit, after having carried them from the ſea-ſide through the dry and burning deſerts of their own country, at the great riſk of being murdered by Galla. Bruce's Travels into Abyſſinia, vol. ii. and iii.

DANCE, an agreeable motion of the body, adjuſted by art, to the meaſures of a piece of muſic, either ſung or played.

The word is French, *dance*, formed of the German *danz*, or *tantz*, which ſignifies the ſame thing. Bochart derives it from the Arabic *tanza*, and Guichart from the Hebrew דוץ *douts*, which have all the ſame ſignification. Salmaſius derives the French, dancer, to dance, from the Latin denſare, to thicken; as holding it a practice among the ancient fullers to leap and dance as they fulled their cloths.

 Some

Some diſtinguiſh the high dance, conſiſting of capers, gambades, &c. from the low dance, which is terra à terra or cloſe to the ground.

In the carouſal of king Louis XIII. there were dances of horſes. The invention of ſuch dances is attributed to the Sybarites.

Dancing has always been in uſe among all nations, both civilized and barbarous; though held in eſteem among ſome, and in contempt among others. Of itſelf, no doubt, dancing is harmleſs. There is a time, ſays the preacher to dance; and ſometimes it is even made an act of religion. Thus David danced before the ark, to honour God, and expreſs his exceſs of joy for its return into the city of Sion. The daughters of Shiloh are likewiſe ſaid to have danced in a yearly feaſt of the Lord. Judges, chap. xxi. And we find many references to this practice in the religious ſolemnities of the Jews. From them it paſſed to the Egyptians, and afterwards to the Greeks and Romans, with whom it was a principal part of the worſhip of their falſe Gods. It afterwards was adopted in many pagan nations; and Chriſtians in popiſh countries celebrated certain feſtivals, particularly thoſe of the ſacrament, and paſſion of our Lord, with dancing. Socrates learnt to dance of Aſpaſia. And the people of Crete and Sparta went to the attack dancing. On the other hand, Cicero reproaches Galbinius, a conſular man, with having danced. Tiberius expelled the dancers out of Rome: and Domitian excluded ſeveral members from the ſenate, for having danced. Caſtor and Pollux are ſaid to be the firſt who taught the art of dancing; and that to the Lacedæmonians: though others attribute the invention to Minerva, who, they ſay, danced for joy after the defeat of the giants.

The ancients had three kinds of dances, called bacchic; the firſt grave, called emmelia, anſwering to our low dances and pavanes. The ſecond gay, called cordax, anſwering to our courants, galliards, gavots, and vaults. The third, called ſiccinis, was a mixture of gravity and gaiety. Neoptolemus, ſon of Achilles, taught the Cretans a new ſort of dance, called Pyrrhica, or the armed dance; to be uſed in going to war: though, according to mythologiſts, the Curetes firſt invented this dance, to amuſe and divert the infant Jupiter, and to drown his cries with the noiſe and claſh of their ſwords, beating againſt their bucklers.

Diodorus Siculus, in the fourth book of his Bibliotheca, aſſures us, that Cybele, daughter of Menoes, king of Phrygia, and Dindymenis his wife, invented divers things, and, among others, the flageolet of ſeveral pipes, dancing, the tabor, and the cymbal. Numa, it is certain, inſtituted a ſort of dance for the ſalii, prieſts of Mars, who made uſe of weapons therein. From theſe dances were compoſed another ſort, called ſaltatio mimicorum, or the buffoons' dance; wherein the dancers were dreſſed in little corſlets, with gilt morions, and had bells on their legs, and ſwords and bucklers in their hands. Lucian has an expreſs treatiſe, and Julius Pollux a chapter, on this head; Athenæus, Cælius Rhodiginus, and Scaliger, alſo make mention of this dance.

It is not many years ago ſince Thoinot Arbeau, a dancing-maſter of Paris, gave an orcheſography, wherein all the ſteps and motions of a dance are written, or noted down; as the ſounds of a ſong are ſcored in muſic. Though the famous Beauchamp has ſome pretenſions to be the inventor of this ſecret, and accordingly procured an arret in his favour.

Dancing is uſually an effect and indication of joy among moſt nations: though M. Palleprat aſſures us, that there are people in South America, who dance to ſhew their ſorrow; and it likewiſe made a part of the funeral ſolemnities of the ancients.

Dancing is ſo neceſſarily connected with muſic, that in treating one art we cannot avoid alluſions to the other. What is it that excites dancing? Muſic. What is it that regulates the ſteps of the dance? Muſic. What is it that exhilarates and keeps off fatigue, but muſic? One of the moſt ancient proverbs in our language ſays; "No longer pipe, no longer dance," a truiſm which Ray has recorded among our national apophthegms.

From the ſocial and ruſtic dance of our peaſants and domeſtics to the ſublime ballet heroïque, muſic is called in to animate and enliven the one, and to give grace and dignity to the other. No muſic can boaſt a ſuperior longevity to our country dances. No muſic is more accented, more impreſſive, and more varied in its meaſures, than that of the grand ballets, which of late years have been performed at the opera.

Muſic and dancing are frequent rivals; but as they cannot ſubſiſt without each other, their little jealouſies never come to an open quarrel.

Much has been written concerning the antiquity of this art, particularly in France, the reſidence of all the divinities who preſide over it. But Pere Meneſtrier, M. Cahuſac, and the celebrated ballet maſter, Noverre, have nearly exhauſted the ſubject. Mademoiſelle Heynel, and the family of Veſtris, have left impreſſions of their ſuperior talents that will never be obliterated by the natives, nor will foreigners or poſterity be ſuffered to remain ignorant of their ſuperior worth, by hiſtorians and men of letters; any more than the readers of the reign of Auguſtus will be allowed to remain ignorant of the pantomimical powers of a Pylades or a Bathyllus.

Muſic, Lucian ſays, is attendant on the art of dancing, and ſubſervient to it. They are more reciprocally uſeful to each other, perhaps, than muſic and poetry; but muſic has its peculiar charms totally independent of both. Modern poetry of various kinds can delight without muſic, but melody is the ſoul of ſongs, without which few would find readers; and dancing, without muſic, would be heavy work, and to a ſpectator excite no other idea than the freaks of inſanity.

Dancing was probably at firſt no more than geſticulation, and moving gracefully in a proceſſion: a natural pantomime; and it has often been ſtyled by philoſophers, the art of geſticulation; and though at firſt natural and ſpontaneous, theſe geſtures were at length poliſhed and refined into rule; but it ſeems as if the firſt dances were religious, and hymns the firſt ſongs. Theſe were the germs of the two arts.

With the ancient Hebrews, as the ſacred writings inform us, dancing made a part of the celebration of all great events. David danced before the ark. In Egypt dancing was a principal part of the religious rites of the prieſthood; and it was in imitation of them that the children of Iſrael danced round the golden calf in the deſert. As the Greeks had their mythology from Egypt, Orpheus who travelled thither for knowledge, is ſuppoſed to have introduced into his country feſtal ceremonies ſimilar to thoſe of Egypt, in all which dance and ſong prevailed. The ingenuity and elegant taſte of the Greeks ſoon improved, refined, and poliſhed theſe ſacred ceremonies, which were adopted by the greateſt part of the civilized world; particularly by the Romans, who were original and ſuperior in nothing but the art of war, and in plundering, ſlaughtering, and enſlaving mankind.

Theſe were the religious dances of Paganiſm: but as a new religion is generally a reform of one more ancient, as the

Grecian

Grecian of the Egyptian; the Roman of the Grecian; the Chriſtian of the Jewiſh, &c., many forms and ceremonies to which the people have been long accuſtomed are neceſſarily retained; and among theſe the ſolemn dances of the Hebrews and Romans, on great feſtivals and celebrations, were admitted by the primitive Chriſtians; in which even the biſhops and dignified clergy, according to Scaliger and Pere Meneſtrier, were performers; and diſpoſitions were made in the firſt temples that were erected after Chriſtianity was firmly eſtabliſhed by Conſtantine, for theſe ſacred dances. Scaliger ſays, that the firſt biſhops were called *Præſules* in the Latin tongue, for no other reaſon than that they led off the ſolemn dance in great feſtivals: and Meneſtrier (Traité des Ballets, 1682) ſays, that he had ſeen the canons and choriſters, on Whitſunday, take each other by the hand and dance while they ſung hymns of jubilation. (And he has pointed out ſeveral ancient churches, ſtill ſubſiſting, in which the choir was conſtructed in a theatrical form.) After ſpeaking of the religious dances of the Hebrews and Pagans, this writer obſerves, that the name of choir is ſtill retained in our churches for that part of a cathedral where the canons and prieſts ſing and perform the ceremonies of religion. The word comes from χορος a *dance*, or a *company of dancers*. The derivation is remarkable, and not one of thoſe that can be ſuſpected of proceeding from fancy, and accidental ſimilitude of ſound. One of the acceptations of the term χορος, given by Suidas, is—το συςημα των ἐν ταις ἐκκλησιαις ἀδοντων—a *company of ſingers in a church;* that is, a *choir*. It ſeems likewiſe to have been ſometimes uſed, like our word *choir*, in the *local* ſenſe: χορος, ſays Suidas, και οἱ χορευται, και ὁ τοπος, &c. that is, *dancers*, and *the place* in *which* they *danced*. It is ſo uſed by Homer, Od. viii. 260. Λειηναν δε χορον.—They made ſmooth, or level, the *place* appointed for *dancing*. The choir was formerly ſeparated from the altar, and elevated in the form of a theatre, encloſed on all ſides with a baluſtrade. It had a pulpit on each ſide, in which the epiſtle and goſpel were ſung, as may ſtill be ſeen at Rome in the churches of St. Clement and St. Pancratius, the only two that remain in this antique form. Spain, continnues he, has preſerved in the church, and in ſolemn proceſſions, the uſe of dancing to this day; and has theatric repreſentations made expreſsly for great feſtivals, which are called *Autes Sacramentales*. France ſeems to have had the ſame cuſtom till the twelfth century, when Odo, biſhop of Paris, in his ſynodical conſtitutions, expreſsly orders the prieſts of his dioceſe to aboliſh it in the church, cemeteries, and public proceſſions. Conſtitut. 36.

The deſcendants of the original inhabitants of our iſland, the Cambro-Britons, in our own memory, on Sundays, uſed to be played out of church by a fiddle, and to form a dance in the church-yard at the concluſion of the ſermon. Theſe could hardly be called religious dances, though in ſome meaſure connected with the ſervice of the church, where the people are aſſembled; but however harmleſs the practice may originally have been, it has, we believe, been totally diſcredited and aboliſhed by the diſſenters and methodiſts. In France, ſays M. Cahuſac, this ſimple and ruſtic amuſement, which ſeemed to imply gentle and cheerful manners, is now changed for a little wit and much corruption. (Traité Hiſtorique de la danſe.)

On the ſtage, heroic and hiſtorical ballets ſeem very early to have been introduced at Athens, either as intermezzi or in the texture of the drama. The labyrinth of Crete, the battle of Theſeus and the Minotaur, and other well known and popular ſubjects, were repreſented in pantomime, without oral utterance. Proteus, of whom ſuch marvellous changes of figure are related, was only one of their dancers.

In this art, like all others, the Greeks were copied by the Romans.

Pylades, a native of Cilicia, and Bathyllus of Alexandria, carried the pantomimical art at Rome to ſuch perfection in the time of Auguſtus, that all other ſpectacles were neglected by the public. Theſe actors opened a theatre at firſt in partnerſhip; Pylades repreſented grave, tender, and pathetic ſubjects; Bathyllus, ſuch as were cheerful, gay, and jocoſe. But each reciprocally mortified by the applauſe acquired by the other, of which each thought himſelf ſeverally robbed, they ſeparated in a fit of jealouſy, and each ſetting up for himſelf, improved the art by opening different theatres, forming ſcholars, and exhibiting to ſpectators partial to the peculiar talents of each. The public took ſides, diſcuſſed and diſputed their ſeveral merits, and forgot the loſs of the republic and of liberty, to the great increaſe of political tranquillity, and eaſe of Auguſtus and his imperial government. Rome was divided into two factions, the Pyladians and Bathyllians, as France ſome years ago into Gluckiſts and Picciniſts. In the time of Nero, a dancer repreſented the labours of Hercules, traced, in a manner ſo true, all the different ſituations of this hero, that a king of Pontus who ſaw this exhibition for the firſt time, followed the geſtures of the actor ſo cloſely as to comprehend with facility every circumſtance, and was ſo delighted that he entreated the emperor, as a great favour, to let him take the dancer home with him; informing Nero, that he had barbarous neighbours, whoſe language no one underſtood, and who had never been able to learn his own, but he thought the geſticulations of this man would explain his wiſhes to them.

P. Meneſtrier, not a philoſopher, but a regular eccleſiaſtic, who lived under, and wrote for a religious prince (Louis XIV.), ſays, that dancing is in itſelf one of thoſe indifferent things of which the good or bad uſe may incline us to approve or condemn.

The ſages of antiquity regarded dancing as a uſeful bodily exercife, an inoffenſive relaxation, and as an efficacious preſervative againſt the diſorders of the mind. When the body is in motion, the mind repoſes itſelf. The figure, the ſteps, the movements of the dance, are equally amuſing to the dancer and the ſpectator. See BALLET and PANTOMIME.

The intimate connexion between muſic and dancing is ſuch as to require a ballet-maſter, not only to be a practical muſician, but a judge of compoſition; if not a compoſer himſelf he ſhould be able to ſuggeſt ſuch ſubjects to the maeſtro di cappella, as will expreſs his ideas, ſuit his principal ſubject, and paint the ſituations into which the ſeveral characters are thrown. Noverre thought that a ballet well compoſed wanted no recit, no words to explain its meaning. Singing and dancing together mutually weaken each other; and even St. Auguſtine, in ſpeaking of ballets, in the third century, complained of their monotony, and ſaid that they were obliged to place a crier at the ſide of the ſcene, to proclaim to the ſpectators what the dancers were about to repreſent. The recits, dialogues, and monologues in the ſplendid dances of Lulli's operas in the time of Louis XIV., Noverre cenſures. He puts great contempt upon mere dancing, and wants to reduce the whole art to pantomime, deſpiſing agility and feats of activity. "Les belles pirouettes, les beaux entrechats," and the remaining ſteadily for a conſiderable time, "ſur le petit point du pied, ſeem hors d'œuvres," in his ſyſtem.

As man had ſenſations before articulation and language; and tones of voice expreſſive of joy, ſorrow, pleaſure, and pain; ſo his features muſt have changed, and geſtures varied in theſe various ſituations. At all times, and in all countries, dancing has advanced towards perfection with the drama. The feaſt of

of Flora, at the beginning of May, was more particularly celebrated by dancing than any other Pagan feftival; and among Chriftians the May-poles erected in our villages, adorned with garlands of real flowers, as well as artificial, around which our peafants and domeftics dance, are remains of the Pagan celebration of fpring.

Domeftic feftivity on occafion of the marriage of a child, the anniverfary of a parent's birth, the arrival of beloved and refpected ftrangers, checquered the monotony of ancient fimplicity of manners.

Socrates himfelf learned late in life to dance of the beautiful and accomplifhed Afpafia; and Cato, with all his rigour and feverity of manners, difdained not, at upwards of 60, occafionally to practife what he had learned in his youth.

As there are few amufements, however innocent in the beginning, while in the hands of the judicious, moral, and decorous members of fociety, that do not degenerate into licentioufnefs when imitated by the vulgar; fo dancing among the Romans, when made a trade, and females were hired occafionally to enliven domeftic feftivity and riotous joy by their talents, gave birth to diffolute manners, and depravity.

But on folemn occafions, as mufic had its mania, dancing was not confined to occafions of mirth and joy; there were funeral dances at the interment of great perfonages. And the Spartans advanced to the enemy in a military ftep, that was called the Phrygian dance.

After dancing had been incorporated in the drama of Athens, it became neceffary for the ballet-mafter, according to Lucian, to be poffeffed of univerfal knowledge. Poetry was neceffary to ornament, mufic to animate, geometry to regulate, and philofophy to guide his compofitions. Rhetoric was likewife required to enable him to exprefs and move the paffions, painting to delineate attitudes, and fculpture to form his figures. He ought to be equal to Apelles, and not inferior to Phidias. All times fhould be prefent to his mind, but he ought moft profoundly to ftudy the emotions of the foul, in order to paint its operations by the movements of the body. His conceptions fhould be eafy and natural, his mind lively, his ear nice, judgment found, imagination fertile, tafte certain in felecting whatever is proper and neceffary to his defign. Thefe are rare but indifpenfable qualities with which ancient hiftory, or rather fable, will furnifh him materials for the moft magnificent compofitions.

He muft, therefore, inform himfelf of every important event that has happened in the world, from its rifing out of chaos to the prefent time.

Lucian was born under Trajan, and furvived Marcus Aurelius. "Lucian," adds M. Cahufac, "did not require too much of the ballet-mafters of his time; as at Rome all great fubjects of tragedy and comedy were included in the circle of pantomime. The compofers of ballets were there, at once poets, muficians and actors; whereas in our time, the poet is feldom a mufician, the mufician never a poet, and the actor neither one nor the other."

In the time of Auguftus, the two great actors and mafters of declamation, Rofcius and Æfop, were forgotten, and their talents replaced by thofe of the two great mafters of pantomime, Pylades and Bathyllus. But this was not effected by mere dancing; fteps, movements, attitudes and pofitions were no longer in queftion: there refulted from their performance an expreffion fo natural, images fo refembling, a pathos fo touching, or a pleafantry fo agreeable, that the fpectators thought they heard what they faw. Geftures alone fupplied the fweetnefs of voice, the energy of difcourfe, and the charms of poetry. Hanc partem, &c. Caffiodorus Var. i. 20.

As literature and all the arts partook of the declenfion of the Roman empire, dancing and pantomime could not efcape decay. Rome, fubdued by barbarians, plunged into ignorance: and darknefs covered the reft of the civilized world. Warriors were left, but the culture of the human mind was fo totally neglected, as to convert into a defert and a wildernefs its moft polifhed and fertile provinces.

Few attempts were made to revive the arts in Italy till the 15th century; and thofe connected with the drama were clumfy and awkward. Poetry and painting, indeed, had made great ftrides towards perfection before dramatic mufic and dancing had awakened any public intereft. Dancing made no part of the firft Italian operas; but in the fecond fpecies of melo-drama in Italy, authors tried to unite all the charms of mufic and poetry with the wonders of machinery; and foon after the opera was embellifhed with ballets hiftoriques, fabuleux, and poetiques.

There were ballets poetiques, allegoriques, bouffons, at the court of Turin, to celebrate the nuptials of illuftrious perfonages.

In France, balls, mafquerades, and ballets, after the accident which happened to Henry II., in 1559, fupplied the place of caroufals, tilts, and tournaments.

M. Cahufac, in his "Traité Hiftorique de la Danfe," is miftaken in fpeaking of the firft opera, when he fays, (tome ii. p. 82.) "Ce fpectacle etoit fans danfe;" for it appears in the fcore, printed in 1600, that the chorufes were fung and danced at the fame time, like thofe on the French ftage in the operas of Lulli. But in the firft operas it was certainly the intention of their legiflators, to favour poetry, and conftitute her miftrefs of the feaft; and it was a long time ere mufic abfolutely took the lead. Dancing ftept into importance only during the laft century; but rarely in that preceding it.

There were analogous dances in the firft oratorio at Rome: Dell' anima e corpo, performed in the church of La Vallicella. In the inftructions for performing this oratorio, it is faid, "The performance may be finifhed with or without a dance. If without, the laft chorus is to be doubled in all its parts, vocal and inftrumental; but, if a dance is preferred, a verfe beginning thus: *Chioftri altiffimi, e ftellati*, is to be fung, accompanied fedately and reverentially by the dance. Thefe fhall fucceed other grave fteps and figures of the folemn kind. During the ritornels the four principal dancers are to perform a ballet, *faltato con capriole*, 'enlivened with capers or *entrechats*,' without finging. And thus, after each ftanza, always varying the fteps of the dance; and the four principal dancers may fometimes ufe the *galiard*, fometimes the *canary*, and fometimes the *courant* ftep, which will do very well in the ritornels."

Dr. D'Avenant's dramatic operas, in 1671, were all fet off with the moft expenfive decorations of fcenes and habits, and with the beft voices and dances.

Dryden's definition of an opera, is, "a fiction, reprefented by vocal and inftrumental mufic, adorned with fcenes, machines, and dances."

In July 1697, Italian intermezzi, or interludes and mimical entertainments of finging and dancing, were performed at York Buildings.

Little mention is made of dancing in the firft Italian operas performed in England. At the end of Handel's *amadigé*, there was a dance to the melody of the coro finale, 1715. No ballet-mafter, dance, or dancers, are mentioned after the dramatis perfonæ of any one opera fet by Handel; poetry, compofition and finging, and a complete orcheftra, feem to have fatisfied the public, without doubling the expence

expence of the performance in fupport of an additional art.

It was during the regency of lord Middlefex, that a regular ballet-mafter, principal dancers, and figuranti of both fexes, were taken into falary. Before that period we have heard of individual dancers of great abilities and attractions: fuch as mifs Saintlow, a Camargo, a Barberini, a Sallé, the two Fauffans, the Aurettis, &c. &c.; but ballets heroiques, ballets hiftoriques, ballets allegoriques, &c. feem to have had no exiftence in this country till about the middle of the laft century.

The French feem to have been the firft in modern times to introduce ballets analogues in their mufical dramas. Thofe in all operas written by Luinault and fet by Lulli, are of that kind. The Italians, not infenfible of their fuperiority to all other countries in whatever concerns the fine arts in general, and who are jealous of French pretenfions to rivality, as the French are envious of their claims to preeminence, frankly allow them the palm in dancing. All the Italian writers on the drama, particularly the mufical, recommend the doctrines of Cahufac and Noverre to the confideration and practice of their ballet-mafters.

Algarotti, in his Effay on the Opera, addreffed to the firft Mr. Pitt, 1762, fays, that though his countrymen have compofed and executed fome comic dances, of which the pantomime would have done honour to Pylades and Bathylius; in ferious and heroic fubjects the Italians, and all nations, muft ftrike to the French, who feem by nature and cultivation as much formed for excelling in this art as the Italians in mufic. Dances, analogous, and incorporated in the drama in which they are performed, at prefent, feem preferred in France to all others; but where they are diftinct, and only performed between the acts, a grotefque and comic dance fhould not, in a ferious drama, counteract the labours of the poet and performer, in exciting that pity and terror, which Ariftotle makes the conftituent parts of a tragedy. But even comic dances in a theatre fhould have fome meaning, fomething to intereft, befides capering and feats of activity. Such fhould have a plot, its intricacies and dénouement; and in thefe dances, as well as the heroic, the French incline much more to pantomime, in intelligent and eloquent geftures performed by the hands and features, than by the feet. In Ricoboni's Hiftory of the Stage, dancing is never mentioned; and Algarotti fays, "it never was a conftituent part of the drama, but is always foreign to the bufinefs, and very often repugnant to it. If the fcene of action be in Rome, the dance is often in Holland or China; and if the opera is ferious, the dance is fure to be comic."

Dance *of St. Vitus.* See Vitus.

Dance, *Country.* See Country-*Dance.*

DANCER, *Rope, Schœnobates.* Groddeck, profeffor of philofophy at Dantzic, has publifhed a differtation on rope-dancers, "De Funambulis," full of learning, and an uncommon knowledge of antiquity. He defines a rope-dancer, a perfon who walks on a thick rope faftened to two oppofite pofts; which is precifely what is expreffed by the Latin word Funambulus. But our rope-dancers do more; for they not only walk, but dance and leap upon the rope.

The ancients, it is certain, had their rope-dancers as well as we: witnefs the Greek words, neurobates, and fchœnobates; as well as the Latin funambulus, which everywhere occur. They had likewife the cremnobates and oribates, that is, people who walked on the brinks of precipices. Nay more, Suetonius, in Galba, cap. 6. Seneca in his eighty-firft epiftle, and Pliny, lib. viii. cap. 2. make mention of elephants that were taught to walk on the rope. This they did both backwards and forwards, as well as up and down; and this feat Galba firft caufed to be exhibited to the Roman people. After this, fuch was the confidence repofed in the dexterity of the animal, that a perfon fat upon an elephant's back while he walked acrofs the theatre upon a rope, extended from the one fide to the other. Lipfius, who has collected the teftimonies, thinks they are fo ftrong, that they cannot be doubted. "Epiftolarum felectarum centuria." Antwerp, 1605. 4to. Suet. Vit. Galba. Seneca Epift. 26. Dio Caffius. In the 13th century fome ventured to ride a horfe upon a rope.

Mr. Groddeck, coming from the hiftorical to the moral confideration, maintains that the profeffion of a rope dancer is not lawful; that the profeffors are infamous, and their art of no ufe to fociety; that they expofe their bodies to very great dangers; and that they ought not to be tolerated in a well-regulated ftate. But, coming afterwards to temper the feverity of his morals, he allows that there are fometimes reafons for admitting them; that the people muft have fhews; that one of the fecrets of government is to furnifh them therewith, &c.

The ancient rope-dancers had four feveral ways of exercifing their art; the firft vaulted, or turned round the rope, like a wheel round its axis, and there hung by the heels or the neck. The fecond flew, or flid, from above, downwards, refting on their ftomachs, with the arms and legs extended. The third run along a rope ftretched in a right line, or up and down. Laftly, the fourth not only walked on a rope, but made furprifing leaps and turns thereon. But it is needlefs to recount the various feats of this kind that are exhibited in our places of public amufement.

DANCERIES, an old French term for country-dance tunes. Jean d'Etrées, a performer on the hautbois in the fervice of Charles IX., publifhed at Paris, in 1564, four books of Danceries, firft writing down the common lively tunes, which, till then, had been probably learned by the ear, and played by memory, about the feveral countries fpecified in the title. The editor of thefe books tells us, that they contained Les chant des branles communs, gais, de champagne, de Bourgogne, de Poitou, d'Ecoffe, de Malte, des Sabots, de la Guerre, & autres gaillardes, ballets, voltes, baffes dances, hauberrois, allemandes. Printed at Paris, 1564.

DANCERS, in *Ecclefiaftical Hiftory,* a fect that fprung up at Aix-la-Chapelle in 1373, and fpread through Flanders. Perfons of both fexes were fuddenly feized with dancing fits, and continued them, with extreme violence, till they were quite exhaufted; and at thefe times they pretended to receive wonderful vifions. Like the Flagellants, the dancers wandered about from place to place, had recourfe to begging for their fubfiftence, treated with the utmoft contempt both the priefthood, and the public rites and worfhip of the church, and held fecret affemblies. This new kind of phrenzy was regarded by the ignorant clergy of that age as the work of evil dæmons, who poffeffed, as they thought, this dancing tribe. Accordingly the priefts of Liege endeavoured to caft out the devils, which rendered thefe fanatics fo merry, by finging hymns and applying fumigations of incenfe; and they gravely tell us, that the evil fpirit was entirely vanquifhed by thefe powerful charms. The French prophets, or convulfionifts, in later times, and fome wild enthufiafts in America, and in our own country, under the appellation of *fhakers, jumpers,* &c. refembled thefe more ancient religious dancers.

DANCETTE', in *Heraldry,* is when the out-line of any bordure, or ordinary, is indented very largely; the largenefs

of the indentures being the only thing that diftinguifhes it from indented.

There is alfo a bearing of a bend, called *double dancetté ;* thus, he beareth azure, a bend *double dancetté* argent.

DANCHE', or *Denché*, the fame with indented ; or, as others will have it, with *dancetté*.

DANCHET, Antony, in *Biography*, a French poet, and man of letters, was born at Riom in 1671. His parents were of low rank, but by the exertions of his friends he was enabled to acquire a good education, and was at length admitted ftudent in the college of Louis le Grand at the time of taking Mons and Nice. He wrote a Latin poem upon thefe victories, which was printed while he was ftill a collegian. He was afterwards chofen rhetorical profeffor in the college of Chartres, which poft he occupied four years. In after-life he applied himfelf chiefly to poetry, and the belles lettres, was admitted a member of the French academies, and had a place affigned him in the royal library. He died in 1748. He had no claims to be ranked in the firft clafs of literary excellence, but his works obtained for him a confiderable fhare of reputation ; they were collected and publifhed in 1751 in four volumes 8vo. As a man he was highly efteemed for the qualities of his mind and the mildnefs of his temper; he was fincere, upright, and difinterefted, and was an enemy to every fpecies of fatire and calumny, weapons too frequently ufed by poets and men of genius. Moreri.

DANCKERT, or Danckerts, Cornelius, a defigner and engraver, born at Amfterdam in 1561. There were feveral engravers of this name, and moft probably of this family, of which Cornelius may be confidered the head. He eftablifhed himfelf at Antwerp as a print-feller ; but he did not fuffer this employment to engrofs his whole time, as he engraved many portraits, landfcapes, and hiftorical pieces, as well from his own compofitions as from the defigns of Berghem, Rembrandt, and others. We fhall only mention the following : Guftavus Adolphus, king of Sweden, a large plate ; Cornelius de Wit, in a battle, ditto ; John Calvin, a large, oval plate. The following are from his own defigns : the four Monarchies, Ninus, Cyrus, Alexander, and Cæfar ; Figures on Horfeback, with emblematical devices, 4 plates, folio ; the feven Wonders of the World, 7 plates, folio ; the principal Subjects of the Old Teftament, 100 fmall prints, 4 on each plate ; a fet of Views in Holland, 6 plates. Huber.

Danckerts, Danckert, the fon of Cornelius, was born at Antwerp, about the year 1600. He alfo engraved different fubjects, as well from his own defigns as from thofe of other artifts ; and though his pieces are not fo numerous as his father's, they furpafs them in merit. Danckert combined the point and the graver with very great fuccefs, and the pieces from Berghem and Wouvermanns, which he has wrought in this manner, are much efteemed. We fhall mention a few of his engravings : the Portrait of Charles II. king of England, folio ; Venus and Cupid, afleep, fpied by a Satyr, folio, marked *D. Danckerts, exc. ;* Pigeon-fhooting and Stag-hunting, a pair, large plates, from Berghem, *Danckert Danckerts fec. et exc.* ; four large Landfcapes, from Berghem, lengthways ; another fet of four, of a fmaller fize, from the fame mafter ; another fet of fix, ftill fmaller, from the fame. Huber.

Danckerts, John, a defigner and engraver, who, about the year 1654, fettled at Amfterdam ; but being invited into England, he went to London, where he defigned for the Englifh Juvenal, the plates engraved by Hollar. This artift alfo engraved fome plates. We fhall only mention the following : Venus lying upon a Couch, from Titian, *Joh. Danckerts, sc. aq. forti* 1657. ; Merchants fhipping their Goods *Joh. Danckerts sc.* Huber.

Danckerts, Henry, brother to the above, was alfo bred an engraver, but afterwards became a landfcape-painter. He was born at the Hague, but at an early age travelled into Italy, from whence he came to England. Here he enjoyed the favour of Charles II. who employed him to draw views of the Britifh fea ports, and royal palaces. During the difturbances which preceded the abdication of James II. (Walpole, by a ftrange anachronifm, fays, *in the time of the popifh plot*), he quitted England for Amfterdam, where he died foon after. The landfcapes painted by this artift were numerous, and are chiefly to be found in England. Amongft them are Views of Windfor, Plymouth, Penzance, &c. marked HDankers, F. 1678, 1679. He alfo engraved from Vandyk, Titian, Jacopo Palma, &c. Walpole. Huber.

Danckerts, Justus. This artift was of the fame family as the former. He was a defigner, engraver, and print-feller, and refided in Amfterdam. The following plates bear his name : the Portrait of Cafimir, king of Poland ; a ditto of William III., prince of Orange ; the Harbours of Amfterdam, a fet of 7 pieces. Huber.

Danckerts de Ry, Cornelius. The circumftance of both Milizia and Heinecken dating the birth of this architect in 1561, and faying that he was born in Amfterdam (the very time and place of the birth of Cornelius Danckerts mentioned above), leads us to fufpect fome chronological error, if not, indeed, that thefe two artifts were one and the fame perfon. Cornelius was originally a ftonemafon, but afterwards applied himfelf to architecture. He conftructed in the city of Amfterdam many public and private buildings, highly creditable to his talents on account of their beauty and convenience, and, amongft others, three of the principal churches, the exchange, and the gate which leads to Haarlem, the moft beautiful of the city.

Cornelius had a fon named Peter, who was born at Amfterdam in 1605, and afterwards became painter to Uladiflaus, king of Poland. Milizia, Mem. degli Architetti

DANCORITON, in *Ancient Geography*, a town of Illyria, in Liburnia, fuppofed to be the fame that is called by Pliny and Ptolemy Corinium.

DANCRETA, in *Botany*, a name given by the people of Guinea, to a plant which they ufe in diforders of the head, boiling it in water, and ufing the decoction in the way of fomentation. It is a fpecies of bindweed, and is called by Petiver, convolvulus quinque foliis Guinenfis foliis non ferratis, or the five-leaved Guinea bindweed, with leaves not ferrated. Cafpar Bauhine, in his Prodromus, defcribes a fpecies of bindweed growing in Egypt, which exactly agrees with this in all particulars, except that it is finely ferrated all round the edges of the leaves. Phil. Tranf N° 292.

DANDA, in *Geography*, a river of Africa, which feparates Kongo Proper from the kingdom of Angola. It is a confiderable river, and navigable quite up to the town of Icoa ; that is, about 30 leagues and upwards. This river gives its name to the province through which it paffes, and the countries of which it fertilizes ; but without caufing fuch deftructive inundations as the Zair. Its navigation, though not difficult or dangerous, is fubject, however, to the interruption and moleftation of the numerous fwarms of crocodiles, fea-horfes and monftrous ferpents, which infeft it, and make a dreadful havoc among thofe who frequent it in canoes and other fmall veffels. Its courfe is from fouth-eaft to northweft ; during which it receives the Lucale, and fome other lefs confiderable ftreams. This river, and alfo the Bengo and Lucale, are fuppofed to fpring from a lake among the high

high mountains in the eaft. On the northern fhore of its mouth is a fort, called "Danda Capitantria," which ferves as a guard of the frontiers between Kongo and Angola.

DANDACA. in *Ancient Geography*, *Efki-Foros*, a town of the Cherfonefus Taurica, upon the moft wefterly point of the peninfula, W.N.W. of Cherfonefus.

DANDAGULA, a town of India, on this fide of the Ganges, in the vicinity of the promontory of Calingon.

DANDAR, in *Geography* a circar of Hindooftan, in the country of Guzerat, on the banks of the Puddar, S.W. of Oudipour.

DANDARICA, in *Ancient Geography*, a kingdom fituated S.E. of the Palus Mæotides, which was traverfed by the river Hypanis.

DANDARII, a people of Afia, who inhabited the vicinity of mount Caucafus, Steph. Byz. Strabo places them to the fouth of the Palus Mæotides. Thefe people occupied the northern coaft of the Euxine fea, at the angle of the eaftern part. It is mentioned by Ammianus Marcellinus.

DANDAXANA, a town of Cappadocia, in the Melitené territory, towards the N.W. of Arca.

DANDELION, in *Botany*. See LEONTODON.

DANDELION, in *Agriculture*, is the name of a very troublefome weed, the *leontodon officinale*, which is well known as infefting meadows and other grounds, and which fpreads greatly where the flowers are fuffered to perfect their feeds, which from being light and downy, are readily capable of being blown about by the wind. It is a weed which fhould of courfe be extirpated as foon as poffible after it appears, in order to prevent its feeding.

DANDINI, CESARE, in *Biography*, a painter of fome eminence, who was born at Florence, about the year 1595. At the age of 12 he was placed under the tuition of Francefco Currado, with whom he ftaid three years: he then became the difciple of Chriftofano Allori, and afterwards of Dominico Paffignano, who took him to Pifa, where he availed himfelf of his affiftance in a confiderable work he was there employed to execute. On his return, Cefare was fent by his father to complete his ftudies at Rome. There he remained fome years, and upon his return to Florence enjoyed the reputation of an experienced and correct painter. His works, which much refemble thofe of Paffignano, are by no means uncommon in the churches and palaces of Florence; but his chef-d'ouvre is an altar piece at Ancona, reprefenting St. Carlo and other faints, which is judicioufly compofed, executed with a mafterly pencil, and well preferved. This artift died at the place of his nativity in 1658. Baldinucci.

DANDINI, VINCENZIO, brother to the laft-mentioned artift, was born at Florence, in 1607. After having been taught the firft rudiments of his art in the fchool of Cefare, he went to Rome, where he ftudied fome time under Pietro da Cortona, and copied with the greateft affiduity the mafterpieces of art which adorn (or then adorned) the palaces and temples of that city. Vincenzio was confidered one of the beft of Cortona's fcholars, and met with ample encouragement from the grand duke, as well as from private perfons, on his return to Florence. He painted a beautiful ceiling, in which he reprefented Aurora attended by the hours, at the villa of Poggio Imperiale; and a large picture of the Sacrifice of Niobe, at that of Petraja. One of his beft altar-pieces, which are frequent at Florence, is the Conception of the Virgin, in the church of Ognifanti. Lanzi. Storia Pitt.

DANDINI, PIETRO, the fon and difciple of Vincenzio, was born at Florence, in 1646. The ftyle of Pietro Dandini, though founded on that of his father, foon degenerated into that mannerifm which is frequently the refult of facility of execution too foon acquired. Although he poffeffed, in the opinion of fome writers, talents even fuperior to thofe of his uncle and father, his defire of gain fo overbalanced the refpect he owed his reputation, that his bold pencil generally contented itfelf to paint the unftudied and ill-digefted compofitions of an hour. Sometimes, however, when he was well paid, he fhewed his abilities; as in a cupola at the church of S. Maria Maddalena, at Florence, as well as in fome frefcoes in the ducal palace and villas. In the public palace at Pifa, is an extenfive compofition by this artift, reprefenting the taking of Jerufalem, which likewife evinces great talent. One of his beft altar-pieces is in the church of the Servi at Florence; it reprefents Beato Piccolomini in the act of faying mafs. Pietro Dandini died in 1712, leaving a fon named Ottaviano, who followed the footfteps of his father in feveral public works which he executed in Florence. Lanzi.

DANDOLO, HENRY, in *Biography*, one of the moft illuftrious of the doges of Venice. In early life he had been ambaffador at the court of Conftantinople, where he maintained the rights of his country with fpirit and dignity. It was not till he had reached his eighty-fourth year that he was advanced to the high honour of doge; but he retained his faculties at that period with fo much vigour, that the events of his government were among the principal caufes of the greatnefs of Venice. The republic, at the commencement of his adminiftration, was engaged in war with the Pifans; but the decifive meafures of Dandolo foon brought it to a termination. He humbled alfo the Veronefe; and on the formation of the league for the fourth crufade, under Baldwin earl of Flanders, application was made to Venice for its affiftance. Dandolo received their deputies favourably, and pleaded their caufe with fo much effect, that a treaty was formed in 1201 upon terms greatly to the advantage of the Venetians, who agreed to furnifh fhips, provifions, and a fquadron of armed galleys. Hoftilities were firft directed againft Zara, which was taken and difmantled; and the conquerors proceeded to Conftantinople, on the pretext of aiding Alexius Angelus to reftore his father, the emperor Ifaac, who had been dethroned by his own brother. The fpirited and venerable doge entered warmly into this meafure, for the fake of procuring to his country an acceffion of commerce and dominion. The fleet arrived before Conftantinople in June 1203, and the fiege was foon begun. In this Dandolo took an active part. At the ftorming of the city, he ftood in a fuit of complete armour, on the prow of his galley, with the great ftandard of St. Mark difplayed before him, commanded his men to row up to the walls, and was the firft who leaped on fhore. The walls and towers on that part were fpeedily occupied by the Venetians, and the banner of the republic fixed upon them, when Dandolo was called away to the affiftance of the French, who were furrounded by fuperior numbers. The Greeks were foon repulfed, and the ufurper fled, leaving his capital to the invaders. Dandolo was afterwards nominated to the high office of emperor; but his great age, and the circumftance of his fituation as doge, rendered it impoffible for him to accept the intended honour. The Venetians, however, fhared the imperial dominions, and Dandolo was folemnly invefted with the title of defpot of Romania. He died at Conftantinople, in the year 1205, at the great age of ninety-feven. Moreri.

DANDOLO, ANDREW, doge of Venice, and the hiftorian of his country, was born about the year 1310. He diftinguifhed himfelf in early life by his attainments in literature, and was in 1344 elected doge. Under his government the military character of his country ranked very high, and its commerce was extended, particularly by a connection with Egypt, which Dandolo formed by meuas of an embaffy to the

the foldan, and the firft Venetian fhips failed to Alexandria in 1345. This new trade occafioned a war between the republics of Genoa and Venice, which continued with various fuccefs fome years, and which gave rife to a correfpondence between the doge, and the celebrated Petrarch. The poet was the friend and advocate of peace; the doge replied, and his anfwer is printed among the epiftles of Petrarch. War was, however, continued, but it caufed the death of Dandolo which happened in September 1354. He was highly efteemed by his countrymen for learning, eloquence, courtefy, and patriotifm. As an author he is diftinguifhed for his "Chronicle of Venice," which comprehends the hiftory of the republic from its foundation to the year 1342; and to him has been afcribed the compilation of the fixth book of Venetian ftatutes. His chronicle obtained confiderable reputation for impartiality, and for the exhibition of authentic documents which the author produced to fubftantiate his facts. Modern Univer. Hift.

DANDRIDGE, in *Geography*, deriving its name from the maiden name of the wife of the prefident Wafhington, a poft and county town of America, in the ftate of Teneffee, and county of Jefferfon; 565 miles W. of Wafhington.

DANDUTI in *Ancient Geography*, a people of Germany, placed by Ptolemy in the neighbourhood of the Tarani, and W. of the Nerterani.

DANE, in *Geography*, a river of England in the county of Chefter, which joins the Weever at Northwich.

DANEBROG, *Order of*, in *Heraldry*, was inftituted by Wilderman II. king of Denmark, on St. Laurence's day, in the year 1219, in commemoration of a ftandard which, as it is pretended, fell miraculoufly from heaven, and revived the courage of Wilderman's foldiers, fo that they beat the Livonians in a battle, in which they were at that time engaged. This ftandard, in which was feen a white crofs, was called, in the language of the country, "Danebrog," or "Danenburgh," *i. e.* the ftrength of the Danes. Chriftian V. in the year 1671, revived the order, which had fallen to decay. The badge of the order is "a crofs pattée enamelled white, charged with 11 diamonds." The collar worn on grand days, is "a chain, confifting of the letters W. C. alternately, and crowned with a regal crown of Denmark; between the letters a crofs enamelled white, in the C. a figure 5;" the firft letter alluding to the inftitutor, and the other to the reviver of the order; on other days the knights have the crofs tied to a white ribband edged red, worn fcarfwife from right to left. The knights likewife have embroidered on their coats a filver ftar, furmounted with a crofs argent, edged gules, and thus infcribed, C. V. RESTITUTOR.

DANEDI, GIOSEFFO, and GIO. STEFANO, called likewife *Montalti*, in *Biography*, two painters, natives of Treviglio, a town in the ftate of Milan, where they flourifhed in the 17th century. They were both educated in the fchool of Morazzone: the former, however, afterwards ftudied with Guido Reni, whofe ftyle he fought to imitate, as appears by his Murder of the Innocents, in the church of S. Sebaftiano, at Milan. Stefano followed the precepts of Morazzone, though, after the example of his brother, he was defirous to add fomething of delicacy to the boldnefs and vigour, which characterize the works of his mafter. One of his beft works is the Martyrdom of S. Giuftina, in the church of S. Maria, in Pedone, at Milan, which is correctly defigned, and exempt from that cold and languid tone of colour which too frequently pervades his works. Gio. Stefano died in 1689, at the age of 81. His brother died at the age of 70, but in what year is unknown. Lanzi.

DANEMORA. See DANNEMORA.

DANEGELT, or *Dane-geld*, from *Dane* and *gelt*, fignifying in Dutch, *money*, an annual tax laid on our anceftors, firft of 1*s*. afterwards 2*s*. for every hide of land through the realm, for maintaining fuch a number of forces as were thought fufficient to clear the Britifh feas of Danifh pirates, which heretofore greatly annoyed our coafts.

It was firft impofed as a ftanding yearly tax on the whole nation, under king Ethelred, A. D. 991. That prince, fays Camden, Britan. 142. much diftreffed by the continual invafions of the Danes, to procure his peace, was compelled to charge his people with heavy taxes, called danegelt. At firft they paid 10,000*l*. then 16,000*l*. then 24,000*l*. after that 36,000*l*. and laftly, 48,000*l*. *per annum*.

Ethelred, in 1008, made a vigorous effort to free his people from this infamous tribute, by a general tax on all the land of the kingdom, for fitting out a fleet, which might effectually guard againft the Danes.

It appears from records, that danegelt was levied in the reign of Edward the Confeffor, not to be paid to the Danes, but to oppofe their invafions; and it feems to have been continued during the firft eight years of that king, as a conftant fund for his navy. We are told, however, that he took it off A. D. 1051, becaufe he faw the devil dance on a heap of the money collected by that tax; but Ingulphus, who mentions this ridiculous tale, only as a popular rumour, gives us a very good reafon why the lands of the kingdom were then difcharged of this burden, namely, there being a great famine that year which moved the king to remit it, out of charity to the poor. Yet it muft be obferved, that this *temporary* evil was no proper caufe for abolifhing a tax, which at other times might be neceffary, to *all perpetuity*; and therefore lord Lyttelton much doubts the hiftorian's exactnefs in faying it was fo abolifhed. Edward's fucceffor, Harold, drew together a fleet of 700 fhips of war; and yet we do not find that danegelt, or other fimilar impofition, was levied by that prince. In the year 1083, or 1084, William the Conqueror, apprehending a great invafion of England from Denmark and Flanders, revived danegelt, and advanced it to fix fhillings a hide; but its produce was little more than had been obtained from former danegelts. It is not certain, that danegelt, or, as the Saxon Chronicle terms it, "militare tributum," was even exacted by William Rufus. It appears by the "great roll," commonly called the fifth of king Stephen, but which Mr. Madox has demonftrated to belong to the reign of Henry I. that it was collected fix years together by that king, and accounted for in the fame words that were wont to be ufed in accounting for the fettled yearly revenue. Of Stephen's reign we have no rolls; but fome hiftories take notice of his levying of danegelt, which he had a good pretence to do, as he was in perpetual fear of invafions from Normandy, or other parts of France, in favour of Matilda, or her fon. We find by the rolls that it was paid in the 1ft, 2d, 20th, and 21ft years of Henry II. The low ftate in which he found the fleet of England might make it neceffary for that prince to continue this impofition till the third year of his reign; and the danger of an invafion from France or Flanders might naturally induce him to revive it in the twentieth. Upon extraordinary occafions danegelt was levied; and although at the end of that century the name was loft, a like provifion was often made, in every age, by our parliaments, for the defence of the Britifh feas, and fecurity of the kingdom. Lord Lyttelton's Hiftory, &c. vol. iii. p. 65, &c.

DANE-LAGE. See COMMON *Law*.

DANE-WORT, in *Botany*. See SAMBUCUS.

DANEWORT, in *Agriculture*, is a term fometimes applied provincially to that fort of elder ufually known by the names of dwarf-elder and wall-wort, (*Sambucus ebulus*). It is remarked

marked by Withering, that the green leaves of this plant drive mice away from granaries; and that the Silefians ftrew them where their pigs lie, under the perfuafion that they prevent fome of the difeafes to which they are liable. It is not eaten either by cows, goats, fheep, horfes, or fwine.

DANET, Peter, in *Biography*, a French abbè, known by his dictionary, Latin and French, compofed for the ufe of the dauphin. He compiled alfo a French dictionary of Greek and Roman Antiquities, in 4to. This was publifhed in 1698, and has been tranflated into Englifh. He was one of the perfons felected as editors of the Delphin claffics: Phædrus fell to his fhare, but his commentary of this poet gained him little reputation. Moreri.

DANGALA. See Dongola.

DANGCANGHAC, in *Ornithology*, the name given by the people of the Philippine iflands to the heron. The Spaniards call it *gazza*. It is the fame fpecies with that fo common in Europe. See Heron.

DANGE, in *Geography*, a fmall town of France, in the department of the Vienne, chief place of a canton in the diftrict of Chatellerault, with a population of 846 individuals. The canton has an extent of 150 kiliometres, 9 communes, and 6753 inhabitants.

DANGEAU, Louis de Courcillon de, in *Biography*, abbot of Fontaine-Daniel and Clermont, was born at Paris, in 1643. His father was marquis de Dangeau, and his mother was defcended from Du Pleffis Mornay, a name celebrated in church-hiftory as an oracle of Calvinifm. Their fon was brought up a Proteftant, but renounced his religion at the perfuafion of Boffuet. He travelled when young, and went to Poland, in 1667, as envoy-extraordinary. On his return he devoted himfelf to literature, and entered the church, but with a determination to accept no benefice which required minifterial duties. He was nominated, in 1671, reader to the king; in this fituation he ufed his influence in rendering his fovereign the patron of letters, and was fo far fuccefsful that many men of real merit and genius were brought forward by his intereft. He was admitted a member of the French academy, and became a moft active and zealous affociate. He was particularly attentive to the ftudy of grammar, and his effays on that fubject were afterwards collected and publifhed by the abbé Olivet in his Opufcules fur la Langue Francoife. The abbé Dangeau, himfelf a convert, became zealous in the converfion of others; but his ardour in this work was foon abated by the mifconduct of fome of his difciples. In the promotion of real knowledge he was very fedulous, and publifhed a variety of introductory pieces for the ufe of young perfons. He formed at his own houfe a literary fociety which affembled weekly, and to which were admitted writers diftinguifhed for talents in every department of learning. Here all party diftinctions were forgotten, and the converfation was carried on with perfect liberty. The abbé was celebrated more by his attachment to truth, than by any other circumftance in life; fometimes his pertinacity to the line of rectitude was deemed obftinacy, yet it was admitted on all hands that he was polite, indulgent, well verfed in the manners of the world, humane and liberal to the indigent. He did much good, and was truly benevolent with a very moderate income. He died generally refpected, and deeply lamented by his friends, in the beginning of the year 1723. Moreri.

Dangeau, in *Geography*, a fmall town of France, in the department of Eure and Loire; 9 miles N. of Chateau Dun, and 18 S. of Chartres.

DANGER, *Iflands of*, iflands in the Southern Pacific Ocean, obferved by commodore Byron, in June 1765, and fo called on account of the rocks and fhoals, which rendered accefs to them dangerous. They had a more fertile and beautiful appearance than any before feen, and like the reft, fwarmed with people, whofe habitations ftood in clufters along the coaft. S. lat. 10° 15′. W. long. 169° 28′.

Danger, *Point*, a cape on the eaft coaft of New Holland. S. lat. 28°. E. long. 153° 30′.

DANGERIA, in *Antiquity*, a payment in money made by foreft tenants, that they might have liberty to plough and fow in time of pannage.

DANGOLISZKI, in *Geography*, a town of Lithuania; 36 miles S. S. W. of Breflaw.

DANGU, a fmall town of France, in the department of the Eure; 3 miles S. W. of Gifors.

DANICHA, a town of Ruffia, in the government of Tobolfk, on the Chatanga; 360 miles N. N. E. of Turuchanfk. N. lat. 70° 45′. E. long. 98° 14′.

DANIEL, Gabriel, in *Biography*, a French hiftorian, was born at Rouen in 1649, where he was educated himfelf, and where afterwards he taught others, in the colleges of the Jefuits. He was invited thence to Paris, to take upon him the office of librarian in the houfe of the order. Of the Jefuits he was a zealous defender, and wrote in their juftification in anfwer to Pafchal: the title of his work was "Entretiens de Cleanthe et d'Eudoxe fur les Lettres Provinciales," for which he was highly applauded by the brethren, but which did not produce the effect defired. A work of more general intereft written by father Daniel was, "Le Voyage au Monde de Defcartes," which was intended as a refutation of the philofopher's fyftem: it has been much read, and tranflated into Latin, Italian, and Englifh. But the moft famous work of this author, and for which he is diftinguifhed as an hiftorian, is the "Hiftoire de France, depuis l'Etabliffment de la Monarchie Francoife." It was publifhed in 17 vols. 4to. in the year 1756. Voltaire, in fpeaking of the author, fays, "He has rectified the faults of Mezerai concerning the firft and fecond race. It has been objected to him, that his diction is not always pure, that his ftyle is too feeble; that he has not given fufficient information concerning ufages, manners, and laws; that his hiftory is a long detail of warlike operations, in which a writer of his profeffion is liable to great miftakes. His great fault is not to have been informed of the rights of the nation, or to have concealed them: he feems to have had no knowledge of the finances, none of the internal condition of the kingdom, or of its manners." Father Daniel, befides the works enumerated, wrote many others on philofophical, theological, and critical fubjects. After a life of intenfe ftudy and labour, he died at Paris in 1728. Moreri.

Daniel, Peter, the intimate friend of the celebrated George Buchanan, was a native of St. Benoit fur Loire; but the principal part of his life was fpent at Orleans. His profeffion was that of an advocate, and he held the office of *bailli* of the abbey of Fleuri. He was zealoufly attached to critical ftudies, and attained to an uncommon familiarity with ancient MSS. Sciopppius (De Arte Critica) characterizes him as a ftore-houfe of every fpecies of antiquities. He lived on terms of intimacy with fome of the moft diftinguifhed fcholars of the age. Scaliger and Turnebus acknowledge themfelves indebted to him for the communication of his MSS. treafures. After his death, which happened in the year 1603, his MS. library was purchafed by Borgars and Paul Petau, for the fum of 1500 livres. His only publications were editions of Petronius, Servius, and of the curious relique, entitled "Querolus five Aulularia," which is the "Aulularia," of Plautus tranfprofed. To this comedy, which had not formerly been printed, he

N 2 prefixed

prefixed the commendatory verses of Buchanan. Irving's Memoirs of George Buchanan.

Daniel, in *Sacred Biography*, one of the Jewish prophets, was a descendant of the royal family of Judah, as we may partly infer from the book of his prophecies, (chap. i. 3.) and as Josephus positively affirms. Whilst he was young, as some suppose at the age of 12 years, though others think he might have been older, or not less than 18 years of age, he was carried captive from Jerusalem to Babylon by Ashpenaz, master of the eunuchs, under the order of Nebuchadnezzar, in the 4th year of Jehoiachim, king of Judah, 605 years B. C. Daniel was called Belteshazzar, and his three companions in exile were Hananiah, Mishael, and Azariah, who were denominated Shadrach, Meshac, and Abed nego. These youths, immediately upon their removal to Babylon, were placed for three years under the tuition of the master of the eunuchs, in order to be instructed by him in the language and literature of the Chaldeans, previously to their admission into the presence and court of Nebuchadnezzar, as his chosen servants. In the 2d year of Nebuchadnezzar's reign at Babylon, from the death of his father, which was the 4th year after his first taking of Jerusalem, B. C. 601, Daniel had liberty of access to the king, and interpreted his dream; upon which he was immediately advanced to be chief of the Magi or wise men, and governor of the whole province of Babylon. For this trust a less period than four years could not have been sufficient for his instruction in the language, laws, usages, and learning of the country; nor, considering his youth when he was made captive, could he at an earlier period have been capable of undertaking it. (Dan. ii. 31. 48). Prideaux reckons him at this time about the age of two and twenty. Thus distinguished by royal favour, he was not unmindful of his three companions in bondage; but by his recommendation, they were preferred to places of honourable trust under him in the province of Babylon. Their constancy in the profession of their religion is particularly related in the third chapter of his book.

In the 7th year of Zedekiah, the 14th of Nebuchadnezzar, B. C. 591, Daniel had acquired such a character for his wisdom, and also for his piety and virtue, that the prophet Ezekiel (ch. xxviii. 3.) records it as a kind of proverb, "Thou art wiser than Daniel," in his ironical address to the king of Tyre; and in another place (ch. xiv. 14. 20.) God is represented as classing him with Noah and Job, and as saying, "Though these three men, Noah, Daniel, and Job, were in it, they should deliver but their own souls by their righteousness." At this time, if we allow him to have been 18, when he was carried away to Babylon, and brought up for the service of the king, he could not have been more than 32 years of age; so that he dedicated the prime and vigour of his life to the service of God. In the 36th year of his age, the 11th year of Zedekiah, 587 before Christ, he received that honourable testimony to his wisdom already recited. (Ezekiel xxviii. 3.) At this time Nebuchadnezzar returned to Babylon, after the end of the Jewish war; and out of the spoils collected in that expedition, made a golden image to the honour of Bel his god, which he dedicated to him in the plain of Dura; and on this occasion he summoned all his officers and ministers to attend, when Daniel's three friends were condemned to the fiery furnace, and were miraculously delivered from it unhurt. (Dan. ch. iii.) Daniel himself, who was probably present, and who, without doubt, did not worship the idol, escaped accusation. In the 35th year of Nebuchadnezzar, the 19th year after the destruction of Jerusalem, 570 B. C., he returned from his Egyptian expedition, to Babylon, and there dreamed of a wonderful large tree, and the cutting down of it, of which we have an account in the 4th chapter of the book of Daniel. This dream was interpreted by the prophet, who thus intimated that it prefigured the future circumstances of the king himself. Upon the death of Nebuchadnezzar, in the 43d year of his reign, B. C. 562, he was succeeded by his son Evilmerodach, or Ilvaradomus, who, after a short reign of two years, fell a sacrifice to his vices; so that his own relations conspired against him, and put him to death. His sister's husband Neriglissar, who was at the head of the conspiracy, reigned in his stead; but this prince being slain in the 4th year of his reign, in a battle with Cyrus, his son Laborosoarchod reigned nine months, and was succeeded by Nabonadius, the last Babylonish king, called in Scripture Belshazzar. In the first year of this king's reign, B. C. 555, Daniel had the vision of the four great beasts, which represented the four monarchies of the Chaldæans, Persians, Greeks, and Romans, and of the kingdom of the Messiah, which was to succeed them, which is recorded in the 7th chapter. In the 3d year of Belshazzar, B. C. 553, he had the vision of the ram and the he-goat, prefiguring the overthrow of the Persian empire by Alexander the Great; and he foresaw also the persecution that was to be raised against the Jews by Antiochus Epiphanes, king of Syria, the vengeance of God upon him, and the victories of the Maccabees, (ch. viii.) Daniel informs us (ch. v.), that Belshazzar (in the 17th year of his reign, B. C. 559.) made a great feast, on which occasion he applied to common or profane uses, the sacred vessels, which he had taken out of the temple of Jerusalem; and in that very night he was slain, and Darius the Mede, that is, Cyaxares the uncle of Cyrus, took the kingdom. The hand-writing on the wall, and the awful interpretation of it by Daniel, which he has particularly recorded, are well known. Cyaxares and Cyrus having concerted together for the division of the empire, determined to divide it into 120 provinces, over which were appointed three presidents, who were to reside constantly at court as the king's ministers. Of these presidents Daniel was made the first; and he was entitled to this pre-eminence on account of his singular wisdom, approved conduct, and long experience; for he had now, from the 2d year of Nebuchadnezzar, been employed full 65 years as a prime minister of state under the kings of Babylon. This station, however, which made him the next person to the king in the whole empire, excited the jealousy and envy of the other courtiers; so that they laid that snare for him, which occasioned his being cast into the lion's den. But being miraculously rescued from injury, this malicious contrivance terminated in the destruction of its authors; and Daniel being established in the favour and confidence of Darius and Cyrus, he greatly prospered in their time, as long as he lived. (Dan. vi. 28.) In the 1st year of Darius, he delivered his famous prophecy of the advent of the Messiah, (see the next article); and he had also another remarkable vision, in which the angel Gabriel discovered to him the events that were to occur in Persia after the death of Cyrus; *viz.* the arrival of Alexander the Great, the overthrow of the Persian empire, the Greek dominion, the continued wars between the kingdom of Syria and Egypt, the persecutions by Antiochus Epiphanes, the destruction of that persecuting prince, and the victory and happiness of the saints. (Dan. x.) Upon the death of Cyaxares, Cambyses being also dead in Persia, Cyrus returned and assumed the whole government of the empire both of the Medes and Persians, over which he reigned seven years. This wise and excellent prince had formed a very favourable opinion of Daniel when he first came to Babylon and took the city; and when he returned thither again from his Syrian expedition,

tion, the fame of the prophet was augmented, and he had additional reafons for holding him in high eftimation. And as Daniel had earneftly fupplicated the Almighty for the reftoration of his people, the Jews, (fee Dan. ix.) it is reafonable to imagine that he would intercede for it with the king, and exert his intereft for the acceleration of this defirable event. In order to induce him the more readily to comply with his requeft, he laid before him the prophecies of Ifaiah, (xliv. 28. xlv. 1.), which mentioned him by name 150 years before he was born, as one whom God had defigned to be a great conqueror, and king over many nations, and the reftorer of his people, in caufing the temple to be built, and the land of Judah and the city of Jerufalem to be again occupied by its former inhabitants. Jofephus tells us, (lib. xi. c. 1.) that Cyrus had feen and read thefe prophecies; and it is plain from Scripture that this was the cafe; for they are recited in his decree in Ezra (i. 2.) for the rebuilding of the temple. Who, indeed, was more likely to fhew thefe prophecies to Cyrus than Daniel, who by his ftation had conftant accefs to him, and who was moft anxious for feeing the accomplifhment of thefe prophecies? When the Samaritans, in the 3d year of Cyrus, B. C. 534, obftructed and retarded the execution of Cyrus's decree for the rebuilding of the temple; Daniel (ch. x.) feems to have furrendered himfelf to mourning and fafting for three days; and he afterwards had the vifion already mentioned concerning the fucceffion of the kings of Perfia, the empire of the Macedonians, and the conquefts of the Romans, &c. of which the three laft chapters of his prophecies contain an account. From what is written in the conclufion of the laft of thefe, we may infer that he died foon after; and, indeed his great age renders it unlikely that he could have furvived much longer. For the 3d of Cyrus being the 73d year of his captivity, if he were 18 years old when he was removed to Babylon, he muft have been in the 91ft year of his age at this time, a length of years to which few attained in thofe days. The place of Daniel's death and burial is not afcertained. Some have fuppofed that he died in Chaldæa, being probably detained there by his great employments in the Perfian empire. St. Epiphanius fays that he died at Babylon, and he is followed by the generality of hiftorians. Jofephus tells us (Antiq. l. x. c. 12.) that he built a famous edifice of the caftellated kind at Sufa; and that this was the place where the Perfian and Parthian kings were ufually buried: the copies of Jofephus, now extent, place this building in Ecbatana in Media; but St. Jerom, who gives the fame account of it *verbatim* out of Jofephus, places it in Sufa in Perfia, whence we may conclude that the copy of Jofephus, ufed by him, had this reading; and this is moft likely to be true. For Sufa being within the Babylonifh empire, the Scripture tells us, that Daniel fometimes refided there; and it has been a common tradition in thofe parts for many ages paft, that Daniel died in that city, which is now called "Tufter;" and there they fhew his monument. (Itinerary Benjamin of Tudela.) It is alfo to be obferved, that Jofephus calls this building Baris, which is the fame by which Daniel himfelf calls the caftle or palace at Shufhan or Sufa. For what we tranflate "at Shufhan in the palace," (Dan. viii. 2.) is in the original "Befhufhan Habirah," where, without doubt, the Birah of Daniel is the fame with the Baris of Jofephus; and both fignifies this palace or caftle built there by Daniel, while he was governor of that province.

Daniel was a very extraordinary perfon, both for wifdom and piety, and exhibits an example of conftancy in maintaining his religious principles and profeffion, notwithftanding the temptations of a profperous and affluent condition, and of a corrupt idolatrous court, which none can contemplate without admiration, and which ought to excite a laudable emulation.

Daniel, *Book of*, a canonical book of the Old Teftament, fo denominated from its author, Daniel, of whofe hiftory and character we have given a brief fketch in the preceding article. See Bible and Canon.

The book of Daniel may be divided into two parts; the *firft* is hiftorical, and contains a relation of feveral incidents that occurred with regard to Daniel himfelf, and the Jews under feveral kings at Babylon: the *fecond*, beginning at the 7th chapter, and ending at the 12th, comprehends the vifions and prophecies, with which he was favoured, and which enabled him to foretell various events, that pertained to the monarchies of the world, the time of the advent and death of the Meffiah, and the deftruction of the kingdom of the Jews. Part of this book, *viz.* from the 4th verfe of the fecond chapter to the end of the 7th chapter, was originally written in the Chaldee language; the reafon of which was, that in this part the writer treats of the Chaldæan or Babylonifh affairs, and, therefore, he wrote of them in the Chaldee or Babylonifh language. The reft is in Hebrew. The Greek tranflation of this book, ufed by the Greek churches through all the eaftern countries, was that which Theodotion had tranflated. This was adopted by the ancient Chriftians, becaufe they found the LXX. verfion too faulty to be ufed in their churches. In the vulgar Latin edition of the Bible, as well as in the Greek tranflation of the book of Daniel by Theodotion, there is added in the third chapter after the 23d verfe, between that and the 24th verfe, the fong of the three children, Hananiah, Mifhael, and Azariah, who were caft into the fiery furnace; and at the end of the book, the hiftory of Sufanna, and of Bel and the Dragon; the former is made the 13th, and the other the 14th chapter of the book in that edition:—but thefe additions were never received into the canon of Holy Writ by the Jewifh church, neither are they extant either in the Hebrew or the Chaldee languages, nor have we any evidence, that they ever were fo. That they were originally written in the Greek tongue by fome Helleniftic Jew, without having any higher fource, from which they are derived, appears from this circumftance, that in the hiftory of Sufanna, Daniel, in his replies to the elders, alludes to the Greek names of the trees, under which, they faid, the adultery charged upon Sufanna was committed, which allufions cannot hold good in any other language. The church of Rome, however, allows them to be of the fame authority with the other parts of the book of Daniel; and by their decree at Trent, (feff. 4.) have given them an equal place with it among the canonical Scriptures. But the ancients never did fo. Africanus, Eufebius, and Apollinarius have rejected thefe pieces, not only as being uncanonical, but alfo as fabulous; and Jerom gives the hiftory of Bel and the Dragon no better title than that of "The Fables of Bel and the Dragon." And others, who have admitted them for inftruction of manners, have, neverthelefs, rejected them from the canonical Scriptures, in which refpect they are followed by the Proteftant churches, which exclude them from the canonical, and affign them to the apocryphal writings. See Apocrypha and Bel *and the* Dragon.

The prophecies of Daniel, concerning the advent of the Meffiah, and other important events, of times far remote from thofe in which he lived, are fo clear and explicit, that Porphyry, towards the clofe of the third century after Chrift, alleged againft them, that they muft have been written

written after the facts to which they refer had occurred. To him they appeared to be a narration of events that had already taken place, rather than a prediction of things to come; fuch was the ftriking coincidence between the facts, when accomplifhed, and the prophecies, which foretold them. Porphyry feems to have been the firft perfon who denied their genuinenefs and authority. In the 12th of his 15 books againft the Chriftian religion, he attempts to depreciate Daniel's prophecies; alleging, that they were not compofed by Daniel, whofe name they bore, but by fome perfon who lived in Judæa about the time of Antiochus Epiphanes, becaufe all to that time contained true hiftory, but all beyond that period were manifeftly falfe. This work of Porphyry (fee PORPHYRY), together with the anfwers of Eufebius, Apollinarius, and Methodius, is wholly loft, except fome few fragments and quotations which are preferved by Jerom, and others of the fathers. But, as Jerom rightly obferves, this method of oppofing the prophecies, affords the ftrongeft teftimony to their truth. For they were fulfilled with fuch exactnefs, that, to infidels, the prophet feemed not to have foretold things future, but to have related things paft. We may obferve, in general, that the prophecy relating to the kings of Syria and Egypt, (ch. xi.) which is faid to have been written after the times of Antiochus Epiphanes, was tranflated into Greek 100 years before his time, and the tranflation was in the hands of the Egyptians, who had no great kindnefs for the Jews and their religion: and thofe prophecies that foretell the fucceffes of Alexander (ch. viii. 5. xi. 3.) were fhewn to Alexander by the Jews, in confequence of which they obtained feveral privileges from him.

The author of "The Scheme of Literal Prophecy" confidered, (A. Collins, efq.) hath followed the fteps of Porphyry; and formed eleven objections againft the book of Daniel, concluding with no fmall degree of confidence, that it muft have been written in the time of the Maccabees. But his two learned opponents, both of the fame name, have folidly and clearly refuted his eleven objections, and fhewn that they are all mere cavils, unfounded affertions, erroneous quotations, or evident contradictions. (See Bifhop Chandler's Vindication of his Defence of Chriftianity, and Dr. Samuel Chandler's Vindication of the Antiquity and Authority of Daniel's Prophecies, in Anfwer to the Scheme of Literal Prophecy confidered.) The following fummary of Mr. Collins's objections, and the replies to them, may not be unacceptable to the theological reader; and comports with the defign of the editor in all articles of this kind, which is to defend and eftablifh the truth of our holy religion, and the authenticity of the Scriptures, upon which our faith in it depends. Collins objects, *firft*, that the famous Daniel, mentioned by Ezekiel, could not be the author of the book of Daniel; becaufe Ezekiel, who prophefied in the fifth year of Jehoiakim, king of Judah, fuppofes that Daniel at that time was a perfon in advanced life; whereas the book of Daniel intimates that he was then a young man. To this objection it has been replied, that Ezekiel did not prophefy in the fifth year of Jehoiakim, nor in the reign of Jehoiakim at all; but he began to prophefy in the fifth year of the captivity of king Jehoiachin, the fon and fucceffor of Jehoiakim (Ezek. i. 2.) that is, 11 years after. When Daniel was firft carried into captivity, he might be a youth about 18; but when Ezekiel magnified his wifdom and piety (ch. xiv. xxviii.) he was between 30 and 40; and feveral years before that period he had interpreted Nebuchadnezzar's dream, and was advanced to an honourable ftation in the court of Babylon (Dan. ii. 48.); and he was therefore very fit and worthy to be celebrated by his fellow-captive Ezekiel. See DANIEL. The *fecond* objection of Collins is, that Daniel is reprefented in his book as living chiefly at the courts of the kings of Babylon and Perfia; and yet the names of the feveral kings of his time are all miftaken in the book of Daniel. As to the miftake of the names of the kings, we may obferve, that there are only four kings mentioned in the book of Daniel, *viz.* Nebuchadnezzar, Belfhazzar, Darius the Mede, and Cyrus. Of the firft and laft there never was any doubt; and the other two may be rightly named, though they have been differently denominated by the Greek hiftorians, who yet differ as much from one another as from Daniel. The Eaftern monarchs, it is well known, had feveral different names: and one writer might ufe one, and another writer might ufe another. Mr. Collins further ftates, that it is more fuited to a fabulous writer than to a contemporary hiftorian, to fpeak of "Nebuchadnezzar's dwelling with the beafts of the field, and eating grafs like oxen, &c." and then returning again to the government of his kingdom. It fhould be confidered, however, that the cafe of Nebuchadnezzar is related in the prophetic figurative ftyle: and ftripped of its figures, the plain meaning is, that Nebuchadnezzar fhould be punifhed with madnefs, fhould fancy himfelf a beaft and live accordingly, and be obliged to fubfift upon a vegetable diet; but after fome time fhould recover his reafon, and refume the government. What is there in this account fabulous or abfurd? The dream was not indited by Daniel, but was told by Nebuchadnezzar himfelf. The *third* objection of Mr. Collins is, that the book of Daniel could not be written by that Daniel, who was a captive at Babylon, becaufe it abounds with derivatives from the Greek, which language was unknown to the Jews till long after the captivity: it is not true, that the book of Daniel abounds with derivatives from the Greek; but an affinity is obfervable between fome few words in the Greek and the Chaldee language; and it is not unreafonable or unlikely, if we advert to the analogy of languages, that the Greeks derived them from the Chaldee, and not the Chaldees from the Greek; or they might both derive them from a common fource. Moft of the words are names of mufical inftruments; and the Greeks themfelves acknowledge that they received their mufic from the Eaftern nations, from whence they themfelves originally defcended. It is objected, *fourthly*, that the book of Daniel does not appear to have been tranflated into Greek, when the other books of the Old Teftament were, which are attributed to the LXX.: the prefent Greek verfion, inferted in the Septuagint, being taken from the tranflation of Theodotion, made in the fecond century of the Chriftian era. It appears, however, that there was an ancient Greek verfion of Daniel, which is attributed to the LXX.; it is cited by Clemens Romanus, Juftin Martyr, and many of the ancient fathers; it occupied a column of the Hexapla of Origen; and it is quoted feveral times by Jerom. This verfion, which had been repudiated by the doctors of the church, and in the room of which Theodotion's was fubftituted, was publifhed fome years ago from an ancient MS., difcovered in the Chighian library at Rome. A *fifth* objection is that of Porphyry already ftated; *viz.* that feveral matters of fact are fpoken of with the clearnefs of hiftory, to the times of Antiochus Epiphanes; whence Porphyry inferred that the book of Daniel was written about the time of this Antiochus, the author appearing to be well acquainted with things down to the death of this prince, but not farther. This indeed is a fingular kind of argument againft the book of Daniel. His prophecies are clear, and therefore are no prophecies. Could

not God who inspired the prophet, enable him to deliver clear predictions of future events, perfectly known to himself? Has he not done so in other instances? Besides, there are several prophecies in Daniel's book, which relate to events far beyond the death of Antiochus; and these are as clear as those that pertain to events that occurred before his death. Mr. Collins's *sixth* objection is, that Daniel is omitted among the prophets, enumerated in Ecclesiasticus, where it seems proper to have mentioned him, if his book had been received as canonical, when Ecclesiasticus was published. The author, however, does not profess to give a complete catalogue of the Jewish canonical writers; others are omitted besides Daniel. No mention is made of Job and Ezra, and of the books under their name. It is of greater importance, that Daniel is proposed (1 Maccab. ii. 60.) as a pattern by the father of the Maccabees, and his wisdom, as we have already seen, is highly extolled by Ezekiel; and there are sufficient testimonies of his antiquity, without the confirmation of a later writer. It is further objected, *seventhly*, that Jonathan, who made the Chaldee paraphrases on the prophets, has omitted Daniel; whence it should seem that his book was not held in the same estimation by the Jews with other books of the prophets. The case is the same with regard to the books of Ezra and Nehemiah; and Jonathan might not have made a Targum or Chaldee paraphrase on Daniel, because half of the book is written in Chaldee: or if he made such a Targum, it has been lost as well as others: and, indeed, bishop Chandler has shewn, that there was an ancient Targum on Daniel. After all it deserves consideration, that Jonathan frequently applies the prophecies of Daniel, as fuller and clearer than those of other prophets, and we may hence conclude, that he was regarded by him as a prophet of equal authority, at least with those who preceded him. The Jews, indeed, since the time of Christ, have not regarded Daniel as a prophet, and therefore they have placed his prophecies only among the "Hagiographa;" alleging, that his manner of life was not conformable to that of the other prophets, but he lived like the courtiers and grandees of Babylon; and that, although he had divine revelations communicated to him, it was not in the prophetic mode, but by dreams and visions of the night, which they reckon to be the most imperfect manner of revelation, and below the prophetic. But Josephus thought very differently. (Antiq. l. x. c. 12.) This Jewish writer reckons him among the greatest of the prophets, and mentions some circumstances relating to his predictions, which evince his superiority to other prophets; and he was always esteemed a prophet by the ancient Jewish church. But the point in dispute between the Jews and Christians is fully decided by the authority of our blessed Lord, who calls him "Daniel the prophet" when he cites his prediction. (Matt. xxiv. 15. Mark xiii. 14.)

"The Jews," says the eminently learned bishop Lowth, (Lectures on the Sacred Poetry of the Hebrews, lib. x. vol. ii. p. 61., &c. Gregory's Translation,) "would refuse to Daniel even the character of a prophet: but the arguments under which they shelter this opinion are very futile: for those points which they maintain concerning the conditions, on which the gift of prophecy is imparted; the different gradations, and the discrimination between the true prophecy and mere inspiration, are all trifling and absurd, without any foundation in the nature of things, and totally destitute of Scripture authority. They add, that Daniel was neither originally educated in the prophetic discipline and precepts, nor afterwards lived conformably to the manner of the prophets. I do not, however, comprehend how this can diminish his claim to a divine mission and inspiration; it may possibly enable us, indeed, to assign a reason for the dissimilarity between the style of Daniel and that of the other prophets, and for its possessing so little of the diction and character of poetry, which the rest seem to have imbibed in common from the schools and discipline in which they were educated."

It has been objected, *eighthly*, that the part of Daniel's book which is written in Chaldee, resembles the style of the old Chaldee paraphrases; which, being composed many hundred years after the time of Daniel, must have a different style from that used in his time; and, therefore, that part could not have been written at a period very remote from the date of the eldest of these Chaldee paraphrases. This argument is one of those which, by proving too much, proves nothing. According to this mode of reasoning, Homer cannot be so ancient an author as he is generally reputed to be, because the Greek language continued much the same many hundred years after his time: but the style of Daniel's Chaldee differs more from that of the old Chaldee paraphrases than Homer does from the latest of the Greek classic writers.

It has been farther objected, *ninthly*, that the book of Daniel seems to have been composed to do honour to the Jews, in the person of Daniel, by making him, as a Jew, superior to all the wise men of Babylon. Hence we might infer, that, because books have been counterfeited under the names of persons of renown, there can be no genuine books of the same persons. Some pieces in Greek have been forged under the name of Daniel, and, therefore, he wrote no book in Chaldee and Hebrew long before those forgeries. Poems have been ascribed to Homer and to Virgil, which they did not compose: and therefore one was not the author of the Iliad, and the other did not write the Æneid. Spurious writings have been attributed to St. Peter and St. Paul, and therefore these apostles have transmitted to us no true writings. As some books have been counterfeited in the name of this or that writer; it is a much more probable presumption than the contrary, that there were some genuine books of his writing.

The *tenth* objection is, that the author of the book of Daniel appears plainly to be a writer of things past, after a prophetical manner, by his uncommon punctuality, by not only foretelling things to come, like other prophets, but fixing the time when the things were to happen. But other prophets have done the same, *e. g.* 120 years for the continuance of the antediluvian world; 400 years for the sojourning of Abraham's posterity in a strange land; 40 years for the peregrination of the children of Israel; 70 years for the desolation of Tyre; 70 years for the captivity of Judah, &c.; and, therefore, the fixing of the times and dates cannot be a particular objection against the prophecies of Daniel. Josephus (Antiq. l. x. c. 11.) ascribes this punctuality to divine revelation, and not, like the objector, to the late composition of the book; and deduces from it an argument in proof of the distinguishing excellence of the prophet.

Lastly, it is objected, that the book of Daniel gives an imperfect, confused, contradictory, obscure, and emblematical relation of facts, blended with images and symbols, unlike the books of the other prophets, and taken from the schools of the Greeks. It may be replied, that Daniel's mode of writing was suited to his design, which was not to compose a history, but to deliver prophecies, and history merely so far as it relates to prophecies. The charge of his contradicting other historical relations is altogether unfounded. As to the censure of his emblems, which are said not to resemble those of other prophets, and to have been borrowed from the schools of the Greeks, this is unjust; for similar emblems

emblems are ufed by other prophets, and they are agreeable to the ftyle and genius of all the eaftern writers of his time. So far from having borrowed them from the Grecian fchools, if any of them ever were ufed by the Greeks, they borrowed them from the oriental writers. The laft objection ill accords with the *fifth* and *tenth*. *There* obvious matters of fact were narrated with the clearnefs of hiftory; and the author was charged with forgery, on account of his uncommon punctuality. *Here* all is dark and emblematical, imperfect, and contrary to other hiftories. Such objections contradict, and deftroy one another. Both may be falfe, but both cannot be true. Upon the whole, we may obferve, that the ftyle of Daniel is not fo lofty and figurative as that of the other prophets; it is clear and concife, and his narrations and defcriptions are fimple and natural; and he writes more like an hiftorian than a prophet.

Of the genuinenefs and authenticity of the book of Daniel, we have all the external and internal evidence, which can be reafonably defired. As to external evidence, we have not only the teftimony of the whole Jewifh church and nation, which have conftantly received this book as canonical, but particularly of Jofephus, who commends Daniel as the greateft of the prophets; of the Jewifh Targums and Talmuds, which frequently cite and appeal to his authority; of St. Paul and St. John, who have copied many of his prophecies; of our Saviour himfelf, who has cited his words, and ftyled him "Daniel the prophet;" of ancient hiftorians, who relate many of the fame tranfactions; of the mother of the 7 fons, and of the father of the Maccabees, who both recommend the example of Daniel to their fons; of old Eleazar in Egypt, who, praying for the Jews then fuffering under the perfecutions of Ptolemy Philadelphus, (3 Macc. vii. 6, 7.) mentions the deliverance of Daniel out of the den of lions, together with the deliverance of the three men out of the fiery furnace; of the Jewifh high prieft, who fhewed Daniel's prophecies to Alexander the Great, while he was at Jerufalem; and of Ezekiel, a contemporary writer, who greatly extols his piety and wifdom. The internal evidence is not lefs convincing; for the language, ftyle, manner of writing, and all other internal marks and characters, are perfectly agreeable to that age; and he appears plainly and undeniably to have been a prophet, by the exact accomplifhment of his prophecies, as well thofe which have been already fulfilled, as thofe which are now fulfilling in the world.

Of the vifions and prophecies of Daniel we fhall now give a brief account. His firft prophecy was his interpretation of Nebuchadnezzar's dream, recorded in the fecond chapter. When the Magi, or wife men, had failed to interpret it, and the king had ordered them to be deftroyed, Daniel offered himfelf to the captain of the guard, benevolently interpofing for preferving the lives of the Magi, under a fentence of deftruction, and modeftly afcribing to divine communication the fuperior wifdom which he poffeffed. The object of Nebuchadnezzar's dream was a great image, whofe form was terrible. This image was not an improper emblem of human power and dominion; and the various metals of which it was compofed do not unaptly typify the various kingdoms which fhould arife. It confifted of four different metals, gold, filver, brafs, and iron mixed with clay; and thefe four metals, according to Daniel's interpretation, mean fo many kingdoms; and the order of their fucceffion is clearly denoted by the order of the parts; the head and higher parts fignifying the earlier times, and the lower parts the later times. "The head of the image was of fine gold," (v. 32.) which Daniel interprets as referring to Nebuchadnezzar himfelf, his family, and his reprefentatives. The Babylonian was, therefore, the firft of thefe kingdoms, fitly reprefented by the head of fine gold, on account of its great riches. But this empire, though of great extent, was yet of no long duration; for it ended in his grandfon Belfhazzar, not 70 years after the delivery of this prophecy, nor above 23 years after the death of Nebuchadnezzar. "The breaft and arms of the image were of filver," (v. 34.) which Daniel interprets in thefe words, (v. 39) "After thee fhall arife another kingdom inferior to thee;" the kingdom which arofe after the Babylonian, was the Medo-Perfian. The two hands and the two fhoulders, fays Jofephus, (Ant. l. x. c. 10. § 4.) fignify that the empire of the Babylonians fhould be diffolved by two kings; who were the kings of the Medes and Perfians, whofe powers were united under Cyrus, by whom Babylon was befieged and taken, and who, putting an end to that empire erected on its ruins the Medo-Perfian, or Perfian empire. Thus far all critics and commentators are agreed, that the two firft kingdoms reprefented in the dream of Nebuchadnezzar were the Babylonian and the Perfian. "The belly and thighs of the image were of brafs," (v. 32.) which Daniel interprets (v. 39.), "And another third kingdom of brafs, which fhall bear rule over all the earth." Alexander the Great, it is well known, fubverted the Perfian empire; and therefore the kingdom which fucceeded to the Perfian was the Macedonian, reprefented by brafs, becaufe, as it is faid, the Greeks were famous for their brazen armour. It has been controverted, whether this kingdom terminated in the perfon of Alexander, or was continued in his fucceffors. The two thighs of brafs, it is fuggefted, might be defigned to denote the Saleucidæ, who reigned in Syria, and the Lagidæ, who reigned in Egypt, who were the only fucceffors of Alexander particularly pointed out, becaufe they had the moft intimate connexion with the Jewifh church and nation. The kingdom of Alexander and of his fucceffors was one and the fame kingdom, though Grotius confidered them as diftinct; for they are fo reprefented by all ancient authors. "The legs of the image are of iron, his feet part of iron and part of clay" (v. 33.), which defcription is interpreted by Daniel (v. 40, 41, 42, 43.) This fourth kingdom is defcribed as ftronger than the preceding, and is fuppofed to reprefent that of the Romans. The Roman empire was ftronger and larger than any of the preceding; and the Romans brake in pieces, and fubdued all the former kingdoms. The two legs of iron might fignify the two Roman confuls; and the iron, mixed with miry clay, might intimate that the Romans were defiled by a mixture of barbarous nations. The Roman empire was at length divided into ten leffer kingdoms, correfponding to the ten toes of the image. Befides the image, already defcribed, Nebuchadnezzar faw "that a ftone was cut without hands, which fmote the image upon his feet that were of iron and clay, and brake them to pieces, &c." (v. 34, 35.) which part of the vifion is interpreted and explained by Daniel (v. 44, 45.) This is underftood by the ancients of the kingdom of Chrift, which was fet up during the days of the kingdom of the Romans. The ftone was totally a different thing from the image, and the kingdom of Chrift is totally different from the kingdoms of this world; it was cut without hands, that is, this kingdom was fpiritual: it was fet up by the God of heaven, and hence the phrafe of the kingdom of heaven came to fignify the kingdom of the Meffiah, as it was underftood by the Jews, and is applied by our Saviour in the New Teftament. This kingdom was to "break in pieces and confume all the kingdoms," to fpread and enlarge itfelf, fo that it fhould comprehend within itfelf all the former

mer kingdoms. This kingdom was to "fill the whole earth," to become univerſal, and to "ſtand for ever."

A revelation, ſimilar to that made unto Nebuchadnezzar, in the ſecond year of his reign, concerning the four great empires of the world, was communicated to Daniel with ſome different circumſtances, in the firſt year of Belſhazzar, or about 48 years afterwards. (Dan. vii.) To Daniel the repreſentation was, not in the form of a great image, but in the ſhape of great wild beaſts. The firſt kingdom is repreſented by a beaſt (v. 4.) that "was like a lion, and had eagle's wings, &c.;" this is the kingdom of the Babylonians, which, by the figures of a lion, the king of beaſts, and an eagle, the king of birds, is deſcribed as the firſt and nobleſt kingdom. The eagle's wings denote ſwiftneſs and rapidity; and the conqueſts of Babylon were very rapid; that kingdom having been advanced to its height within a few years by a ſingle perſon, under the conduct and arms of Nebuchadnezzar. The ſecond kingdom is repreſented (v. 5.) by "another beaſt like a bear, &c." This is the kingdom of the Medes and Perſians, and, on account of their cruelty and thirſt for blood, they are compared to a bear. Its three ribs are underſtood by Jerom, Vatablus, and Grotius, to denote the three kingdoms of the Babylonians, Medes, and Perſians; but ſir Iſaac Newton and biſhop Chandler explain them, as ſignifying the kingdoms of Babylon, Lydia, and Egypt, which were conquered by it, but were not properly parts and members of its body. They might be called ribs, as the conqueſt of them much ſtrengthened the Perſian empire; and they might be ſaid to be between the teeth of the bear, as they were much grinded and oppreſſed by the Perſians. The third kingdom is repreſented (v. 6.) by "a beaſt like a leopard, &c." which aptly repreſents the kingdom of the Macedonians; the ſwiftneſs of the leopard denoting the rapidity of Alexander's conqueſts; its ſpots being emblematic, according to Bochart, of the different manners of the nations which Alexander commanded, or, according to Grotius, of the various diſpoſitions and manners of Alexander himſelf, who was alternately merciful and cruel, temperate and drunken, abſtemious and incontinent. The principal point of likeneſs ſeems to conſiſt in the ſwiftneſs and impetuoſity of the one and the other. The fourth kingdom is repreſented (v. 7.) by a "fourth beaſt, dreadful and terrible, &c." which can pourtray no other than the Roman empire. The 10 horns of this beaſt repreſent 10 kingdoms, which are variouſly enumerated by different writers. Machiavel (Hiſt. Flor. lib. i.) gives them under the following names; *viz.* the Oſtrogoths in Mœſia, the Viſigoths in Pannonia, the Suevi and Alani in Gaſcoigne and Spain, the Vandals in Africa, the Franks in France, the Burgundians in Burgundy, the Heruli and Thuringii in Italy, the Saxons and Angles in Britain, the Huns in Hungary, and the Lombards at firſt upon the Danube, and afterwards in Italy. Mr. Mede (Works, B. iii.), reckons up the 10 kingdoms in the year 456, the year after Rome was ſacked by Genſeric, king of the Vandals, in the following manner: *viz.* Britons, Saxons in Britain, Franks, Burgundians in France, Wiſigoths in the ſouth of France and part of Spain, the Suevi and Alani in Gallicia and Portugal, the Vandals in Africa, the Alemanni in Germany, the Oſtrogoths, ſucceeded by the Longobards, in Pannonia, and afterwards in Italy, and the Greeks in the reſidue of the empire. Biſhop Lloyd (Addenda to Lowth's Comm. p. 524.) exhibits the following liſt, adding to each the time of its riſe; *viz.* Huns about A. D. 356, Oſtrogoths 377, Wiſigoths 378, Franks 407, Vandals 407, Suevi and Alani 407, Burgundians 407, Heruli and Thuringii 476, Saxons 476, and Longobards, who began to reign in Hungary, A.D. 526, and were ſeated in the northern parts of Germany, about the year 483. Sir Iſaac Newton (Obſ. on Daniel, chap. 6.), enumerates them thus: the kingdom of the Vandals and Alans in Spain and Africa, that of the Suevians in Spain, that of the Wiſigoths, that of the Alans in Gallia, that of the Burgundians, that of the Franks, that of the Britons, that of the Huns, that of the Lombards, and that of Ravenna. The number of theſe kingdoms was not conſtantly 10, but ſometimes more and ſometimes fewer; but, as ſir Iſaac Newton obſerves, whatever was their number afterwards, they are ſtill called the "ten kings," from their firſt number.

Beſides theſe 10 horns or kingdoms, another little horn was to ſpring up among them (v. 8.) which Grotius, Collins, and ſome others have ſuppoſed to be Antiochus Epiphanes, without ſufficient reaſon; but we are more probably to ſeek for it in the weſtern Roman empire; and it is commonly conceived to denote the pope of Rome, whoſe power, as a horn or temporal prince, was eſtabliſhed in the eighth century. All the kingdoms above deſcribed will be ſucceeded by the kingdom of the Meſſiah. (v. 9, 10.)

Daniel had another viſion in the third year of the reign of Belſhazzar, or about 553 years B. C. (ch. viii. 1.) This viſion was that of a ram and he-goat. Here we have two beaſts denoting two empires. The Babylonian is omitted, becauſe its fate was nearly terminated. The ram with two horns was the empire of the Medes and Perſians, or the Medo-Perſian empire, founded by Cyrus. Mr. John Mede (Works, B. iii.), conjectures, that the Hebrew word for a ram, and that for Perſia, *i.e.* איל and אלם, both ſpringing from the ſame root, and both implying ſomewhat of ſtrength, the one is not improperly made the type of the other. Beſides, it was uſual with the king of Perſia to wear a ram's head, made of gold, and adorned with precious ſtones, inſtead of a diadem; for thus Ammianus Marcellinus deſcribes him. Biſhop Chandler, Wetſtein, and others, obſerve, that rams' heads with horns, one higher and the other lower, are ſtill to be ſeen on the pillars at Perſepolis. The exploits of the ram are recapitulated in verſe 4; and it is well known that, under Cyrus, the Perſians extended their conqueſts weſtward, as far as the Ægean ſea, and the boundaries of Aſia; northward, they ſubdued the Armenians, Cappadocians, and various other nations; ſouthward, they conquered Egypt. Under Darius they ſubdued India.

The next animal that commands our notice in this viſion is the he-goat (v. 5.); which is properly the type or emblem of the Grecian or Macedonian empire, becauſe the Macedonians at firſt, about 200 years before Daniel, were denominated "Ægeadæ," or the goat's people; the city Ægeæ or Ægæ, was the uſual burying place of the Macedonian kings. In verſes 6 and 7 we have an account of the overthrow of the Perſian empire by the Grecians; for, as the Perſians, in the reigns of Darius Hyſtaſpis and Xerxes, had poured down with great armies into Greece, the Grecians, in their turn, carried their arms into Aſia, and the he-goat invaded the ram that had invaded him. The empire of the goat, as deſcribed in the prophetic language, was in its full ſtrength, in conſequence of the rapid and extenſive conqueſts of Alexander, when he died at Babylon; but, in the ſpace of about 15 years, the royal family became extinct, and the governors of provinces aſſumed the titles of kings. By the defeat and death of Antigonus in the battle of Iſſus, theſe were reduced to four; *viz.* Caſſander, Lyſimachus, Ptolemy, and Seleucus, who parted between them the dominions of Alexander, and ſettled them into four kingdoms. Theſe are the four notable horns, which came up in the room of

of the firſt great horn; and they are the ſame as the four heads of the leopard in the former viſion. The prophecy ſays, that they were to extend "towards the four winds of heaven;" accordingly, in the partition of the empire, Caſſander held Macedon and Greece, and the *weſtern* parts; Lyſimachus had Thrace, Bithynia, and the *northern* regions; Ptolemy poſſeſſed Egypt, and the *ſouthern* countries; and Seleucus obtained Syria and the *eaſtern* provinces. Thus were they divided towards the four winds of heaven. Here a little horn is deſcribed as riſing among the four horns of the Grecian empire, (v. 9, 10, 11, 12.) This is explained in the verſes 23, 24, 25. The little horn is generally underſtood, both by Jewiſh and Chriſtian, and ancient and modern interpreters, to mean Antiochus Epiphanes, king of Syria, who was a great enemy and cruel perſecutor of the Jews. Sir Iſaac Newton entertains a different opinion; nor, indeed, according to the interpetation of other parts of this prophecy already given, is it likely that the little horn ſhould ſignify Antiochus Epiphanes, or any ſingle king; but it ſhould denote ſome kingdom, *i. e.* ſome government, ſtate, or polity in the world, either monarchical, republican, or ſome other form. Our views are, therefore, directed to the Romans. When they gained footing in Greece, they then became a horn of the goat. Out of this horn they proceeded, and were at firſt a little horn, but in proceſs of time they overtopped the other horns; extending their arms from Greece, and overrunning the other parts of the goat's dominions, perſecuting and oppreſſing the people of God, wherever they came. This horn, as ſir Iſaac Newton juſtly obſerves, was to riſe up in the N.W. parts of thoſe nations, which compoſed the body of the goat, and from thence was to extend their dominion towards Egypt, Syria, and Judæa. Another remarkable property of the little horn, and that diſtinguiſhed it from all others, was, that "his power ſhould be mighty, but not by his own power," which deſcription applied more juſtly to the Romans than to Antiochus Epiphanes, or any other ſovereign or kingdom. The ſtrength of the other kingdoms conſiſted in themſelves, and had its foundation in ſome part of the goat; but the Roman empire, as a horn or kingdom of the goat, was not mighty by its own power, or by virtue of the goat, but drew its nouriſhment and ſtrength from Rome and Italy. There grew that trunk and body of the tree, though the branches extended over Greece, Aſia, Syria, and Egypt. The remainder of the prophecy relates chiefly to the perſecution and oppreſſion of the people of God. (v. 24.) Antiochus was perſecuting and oppreſſive to the Jews, but his power was limited, and laſted only for a ſeaſon; but the Romans poſſeſſed and exerciſed a more extenſive and durable power to oppreſs and injure. "He took away the daily ſacrifice" for a few years; but the Romans for many ages; and they utterly deſtroyed the temple, which he only ſpoiled and profaned. When he took Jeruſalem, he ſlew 40,000, and ſold as many more; but when the city was beſieged and taken by the Romans, the number of captives amounted to 97,000, and of the ſlain to 11 hundred thouſand. The Romans put an end to the government of the Jews, and entirely took away their place and nation. It is added, "he ſhall alſo ſtand up againſt the prince of princes." If by the "prince of princes" we underſtand the high-prieſt, it is true that Antiochus appointed and removed the high-prieſts at pleaſure; but the Romans took away the whole adminiſtration. If by the "prince of princes" we underſtand the Meſſiah, Antiochus had no ſhare in the completion of the prophecy; it was effected by the Romans. By the malice of the Jews, but by the authority of the Romans, our Saviour was put to death; and he ſuffered the puniſhment of the Roman malefactors and ſlaves. Moreover, the perſecuting power of Rome, whether Pagan or Chriſtian, whether exerciſed towards the Jews or towards the Chriſtians, by the emperors or by the popes, is ſtill the "little horn." The tyranny is the ſame; but as exerted in Greece and the Eaſt, it is the little horn of the he-goat, or the third empire; as exerted in Italy and the Weſt, it is the little horn of the 4th beaſt, or the 4th empire. But the little horn, like other tyrannical powers, was to come to a remarkable end; "he ſhall be broken without hand;" *i. e.* it ſhall fall, not by the hand of man, but by a ſtroke, as it were, from heaven, ſhall it periſh; in other words, the dominion of the Romans ſhall finally be deſtroyed with ſome extraordinary manifeſtation of the divine power. Antiochus Epiphanes died, indeed, in a very extraordinary manner. (See ANTIOCHUS *Epiphanes.*) But, though in a variety of particulars, the prediction of Daniel may be applicable to his exploits, and to his character, and the general hiſtory of his life, and though it has been thus generally applied; yet it ſeems to have a more extenſive reference, and to receive itsfull accompliſhment in the conduct and hiſtory of the Romans. The anxiety and concern felt by Daniel in the view of the events, that were likely to befal his country and countrymen, ſeem to intimate his apprehenſion of ſome more grievous and permanent calamities which would befal them, than any Antiochus Epiphanes would have it in his power to inflict. In this inſtance, and indeed in every other, Daniel exhibits a moſt amiable temper, no leſs ſolicitous for the honour of religion than for the welfare of his country; alike pious and public-ſpirited; and no leſs eminently a patriot than a prophet.

The memorable events which were revealed to Daniel, in the viſion of the ram or he-goat, are again more clearly and explicitly revealed to him in his laſt viſion; ſo that this latter prophecy may not improperly be ſaid to be a comment and explanation of the former. This revelation was made (ſee ch. x. 1.) in the third year of Cyrus king of Perſia, when Daniel was very far advanced in years; and the prophecy delivered in conſequence of it muſt comprehend the fate and fortune of the people of God for many years. It muſt extend much further than from the 3d year of Cyrus, B.C. 535, to the death of Antiochus Epiphanes, B. C. 165, which was not above 370 years. It comprehends in reality many ſignal events after that time to the end of the world. The firſt prophecy relates to the Perſian empire, which was then ſubſiſting. "Behold, there ſhall ſtand up three kings in Perſia, &c." (xi. 2.) *i. e.* after Cyrus the founder of the empire, who was then reigning. Theſe three kings were Cambyſes, the ſon of Cyrus, Smerdis the Magian, who pretended to be another ſon of Cyrus, and was really an impoſtor; and Darius, the ſon of Hyſtaſpes, who married the daughter of Cyrus; "and the fourth ſhall be richer than they all." The fourth, after Cyrus, was Xerxes, the ſon or ſucceſſor of Darius. Of him it is ſaid that "by his ſtrength through his riches he ſhall ſtir up all againſt the realm of Grecia." Accordingly Xerxes's expedition into Greece is one of the moſt memorable adventures in ancient hiſtory. Xerxes, in raiſing his army, ſearched every place of the continent; and his army is ſaid to have amounted, including ſoldiers and followers of the camp, to 5 millions, 283 thouſand, 220 men. He alſo ſtirred up the weſt, and engaged his allies the Carthaginians to collect an army of 300 thouſand men, and a fleet of 200 ſhips. Alexander is characterized in verſe 3, as "a mighty king that ſhall rule with great dominion, and do according to his will." This prediction is amply verified in the extenſive conqueſts and arbitrary mandates of Alexander. (See his article.) But his kingdom was ſoon to be broken and divided. (v. 4.) We have already ſhewn how ſoon his glory terminated,

terminated, and how his kingdom was divided. In this prophecy two out of the four kingdoms into which his empire was divided, are ſpecified, *viz.* Egypt and Syria, which were by far the moſt conſiderable, and continued diſtinct kingdoms, after the others were ſwallowed up by the Romans. The kings of Egypt and Syria are denominated, in reſpect to the ſituation of theſe countries to Judæa, the kings of the *ſouth* and the *north.* "The king of the ſouth," it is ſaid, "ſhall be ſtrong;" which was verified when Ptolemy had annexed Cyprus, Phœnicia, Caria, and many iſlands, and cities, and regions, to Egypt; and, moreover, by the acquiſition of Cyrene, he was become ſo great, as to be the terror of all his enemies. Neverthelefs, Seleucus Nicator, the king of the north, was "ſtrong above him;" for, having annexed the kingdoms of Macedon and Thrace to the crown of Syria, he was become maſter of three parts out of four of Alexander's dominions. "In the end of years," ſays the prophet, "they ſhall join themſelves together," &c. (v. 6.) All theſe particulars, and thoſe mentioned in verſes 7—30, were verified by the events, which we cannot now recite. This prophecy concerning the kingdoms of Egypt and Syria, from the death of Alexander to the time of Antiochus Epiphanes, is ſo particular and circumſtantial, that it is really more perfect than any hiſtory. The prophecy is equally exact beyond the time of Antiochus, extending to remoter ages, and reaching even to the general reſurrection. The ſequel of the prophecy is ſuppoſed by Porphyry, among the ancients, and by Grotius, among the moderns, to have been literally accompliſhed in Antiochus Epiphanes. Others, however, as Jerom, and moſt of the Chriſtian fathers, conſider Antiochus as a type of Antichriſt. Others again underſtand what remains partly of the tyranny of Antiochus, and partly of the great apoſtaſy of the latter days, or the days of the Roman empire. Others again apply it wholly to the invaſion and tyranny of the Romans, the ſubſequent corruptions in the church, and alterations in the empire. But our limits will not allow us to detail the particulars. For an application of the celebrated prophecy relating to the Meſſiah (ch. ix. 24. 27.), and an account of the exactneſs with which it was accompliſhed, we ſhall refer to the article PROPHECY. See alſo WEEK.

We ſhall now conclude this extended article, with the reflections of biſhop Newton on Daniel's prophecy of the things noted in the Scriptures of truth, recorded in chap. xi. "Upon the whole, what an amazing prophecy is this, comprehending ſo many various events, and extending through ſo many ſucceſſive ages, from the firſt eſtabliſhment of the Perſian empire, above 530 years B. C., to the general reſurrection! And the further it extends, and the more it comprehends, the more amazing ſurely, and the more divine it muſt appear, if not to an infidel like Porphyry, yet to all who, like Grotius, have any belief of revelation. How much nobler and more exalted the ſenſe, more important and more worthy to be known by men, and to be revealed by God, when taken in this extended view, and applied to this long and yet regular ſeries of affairs, by the moſt eaſy and natural conſtruction; than when confined and limited to the times and actions of Antiochus, to which yet it cannot be reconciled by the moſt ſtrained and unnatural interpretation! What ſtronger and more convincing proofs can be given or required of a divine providence, and a divine revelation; that there is a God who directs and orders the tranſactions of the world, and that Daniel was a prophet inſpired by him, "a man greatly beloved," as he is often addreſſed by the angel! Our bleſſed Saviour hath beſtowed upon him (Matt. xxiv. 15.) the appellation of "Daniel the Prophet;" and this is authority ſufficient for any Chriſtian; but in this work have been produced ſuch inſtances and atteſtations of his being a prophet, as an infidel cannot deny, or, if he denies, cannot diſprove. The character that is given of him by Joſephus, is nothing more than ſtrictly his due. It expreſſeth the ſenſe of the Jewiſh church: and the ſame muſt be the ſentiments of every man, who will conſider and compare the prophecies and events together. This hiſtorian is commending the ſuperior excellence of Daniel's predictions; "for he was wont, ſays he, not only to foretell future things, as other prophets alſo did; but he likewiſe determined the time wherein they ſhould happen." Afterwards, having mentioned ſome of Daniel's prophecies, he proceeds thus: "All theſe things, God having ſhewn them to him, he left in writing, that they who read them, and behold the events, might admire Daniel for the honour vouchſafed him by God; and by theſe things might be convinced how much the Epicureans are miſtaken, who deny a providence, and allow not that God regards human actions, nor that all things are governed by a bleſſed and immortal Being for the preſervation of the whole, but aſſert that the world is carried on at random, without a guide or ruler: which, if it was without a governor, as they pretend, would have been deſtroyed by the blind impulſe, and have periſhed and come to nought, as we ſee ſhips, which are deſtitute of pilots, overwhelmed by the ſtorms, and chariots overturned and broken to pieces, which have no drivers. For, by theſe things predicted by Daniel, they appear to me widely to err from the truth, who declare, that God hath no care of human affairs; for we ſhould not ſee all things ſucceed according to his prophecies, if it happened that the world was governed by chance." Prideaux's Connection. Dupin's Hiſt. of the Canon. Newton's Diſſertations on the Prophecies. Calmet's Dict.

DANIEL, in *Geography*, a ſmall iſland in the river Meuſe, a little below Stockem, in the biſhopric of Liege.

DANIEL, *Eau de*, a ſpring of mineral water, in the department of the Gard, in France, not far from Alais, the chief place of the department.

DANIEL, *Port*, lies on the northern ſide of Chaleur bay, and is a commodious harbour for veſſels of a conſiderable draught of water. It affords a cod-fiſhery, and is about nine leagues from Pato, W.N.W. of Cape Deſpair.

DANILOF, a diſtrict and town of Ruſſia, in the government of Yaroſlaf, ſeated on a rivulet that falls into the Volga; 28 miles E.S.E. of Yaroſlaf, and 360 E.S.E. of Peterſburg.

DANILOWICZE, a town of Lithuania, in the palatinate of Wilna; 44 miles S. of Braſlaw.

DANK, in *Agriculture*, a term made uſe of to ſignify damps, humid, moiſt, or wet, as applied to graſs, &c.

DANK, in *Commerce*, a piece of ſilver current in Perſia, and in ſome parts of Arabia, weighing the ſixteenth part of a drachm. It is alſo a weight uſed by the Arabians to weigh jewels and drugs.

DANKALI, in *Geography*. See DANCALI.

DANN, a ſmall town of France, in the department of the Meurthe, diſtrict of Sarrebourg, three miles N. of Phalſbourg, remarkable for a mineral ſpring, called La Bonne Fontaine, which is conſidered as a ſure remedy againſt hemorrhagies.

DANNA, in *Ancient Geography*, a town of Paleſtine, ſituated in the mountains of the tribe of Judah.

DANNEBERG, or DANNENBERG, in *Geography*, a ſmall town of Germany, on the river Jetze, not far from the Elbe, 48 miles S.E. of Luneburg, and 90 N. by E. of Brunſwick, in the duchy of Luneburg Zell, belonging to the king of England, as elector of Hanover, but at preſent in the poſſeſſion of the French. It has about 1000 inhabitants,

bitants, and its diftrict, which is nearly 40 Englifh miles in circumference, comprehends 77 villages. Near Dannenberg is a decayed caftle, at the entrance of which is a tower, where Waldemar II. king of Denmark, is fuppofed to have been confined, in the year 1223, by Guntzel, count of Schwerin: but Bufching very juftly thinks it more probable that Tannberg, in the duchy of Mecklenburg Schwerin, was the place of the Danifh king's confinement.

DANNEMARIE, a fmall town of France, in the department of the Upper Rhine, chief place of a canton in the diftrict of Befort, with a population of 724 individuals. The canton has 27 communes, and 7630 inhabitants, upon a territorial extent of 110 kiliometres.

DANNEMORA, a famous Swedifh iron mine, near Ofterby, 26 Englifh miles N.W. of Upfal, in the government of Upfal, which yields the beft iron in the world. It has no fubterraneous galleries. The pits are deep excavations, like gravel pits, into which the miners go down and from which they are drawn up in a bucket. The richeft ore yields 70, the pooreft 30 *per cent.* The collective mafs gives upon the average one third of pure metal. Twelve thoufand tons are annually drawn from the mine, and yield four thoufand tons of bar-iron. The mafs of ore occupies a comparatively fmall compafs. Confidered as one, the length of the pits is 760 feet, and the breadth from three to twelve. The ore runs in veins from eaft to weft. The richeft pit is near 500 feet deep, and the great pit (Storymningen) has not yet been fathomed. The matrix of the ore, being a calcareous earth, contains but little fulphur, which is perhaps the reafon of the fuperior quality of the iron. Cox's Travels.

Near 300 perfons are employed in mining and tranfporting the ore. The water is drawn out of the pits in fummer by pumps worked by water, and in winter by a fteam engine, which is not ufed in fummer, on account of the fcarcity and dearnefs of coals, and is often heated with wood.

In fummer the ore which is dug is laid out in heaps, and during the winter months it is conveyed on fledges to the forges; the four principal of which are Leufsta, Ofterby, Gimo, and Akerby.

The mine of Dannemora confifts of twelve pits belonging to thirteen different proprietors. Baron de Geer poffeffes more than one-third of the whole mine.

Notwithftanding the mine of Dannemora has been wrought thefe 320 years, having been difcovered in the year 1448, it yet yields a vaft quantity of iron of a fuperior quality, much ufed in the Englifh fteel manufactures of Sheffield and Birmingham.

The fale of the Dannemora iron in England is a monopoly in the hands of two Englifh commercial houfes, one at London, the other at Hull. They procure it exclufively for the Britifh manufactures, by a fpecial contract with the proprietors of the mine.

DANNGE, a river of Pruffia, which runs into the fea at Memel.

DANNOCKS, in *Agriculture*, a term provincially applied to hedging gloves or mittens.

DANT, or LANT, in *Zoology*, called by the Africans *Lampt*, an animal of the figure of a fmall ox, but having fhort legs. It has black horns, which bend round and are fmooth. Its hair is whitifh, and its hoofs are black and cloven. It is fo fwift that no animal, except the Barbary horfe, can overtake it. Thefe dants are common in the deferts of Numidia and Libya, and feveral northern provinces of Africa. Buffon fuppofes that this animal is the fame with the dwarf ox, or *Zebu*, which fee. The name dant has been transferred from Africa to America, and applied to a very different animal. See TAPIR.

DANTE, ALIGHERI, in *Biography*, a celebrated Italian poet, was born at Florence in 1265. He was initiated at an early age to the ftudy of the fciences, and of polite literature under Brunetto Latini. He attached himfelf to the profeffors of the ornamental arts who flourifhed at that period; but was his own mafter in the art of poetry in which he afterwards fo much excelled. When he had attained to years of manhood he joined the military defenders of his country, and was engaged in two actions, one againft the Aretines, in 1289, the other againft the Pifans, in 1290. In the following year he married Gemma, the daughter of Manetto de Donati, from whom, after having had feveral children, he feparated. He entered public life, and was confiderably employed in the affairs of the Florentine republic. In 1300 he was one of the chief magiftrates of Florence, an honour which proved the fource of many of his misfortunes. At that period all the towns of Italy were diftracted by the oppofite parties of the Guelphs and Ghibellines; and in Florence a further diftinction took place in the factions of the Neri and Bianchi, or Blacks and Whites. Dante belonged to the latter, of which a more full account will be given under the word FLORENCE: fuffice it to fay, his party was overpowered, and himfelf imprifoned, with the lofs of his property. He was afterwards banifhed, and fentence of death paffed upon him, fhould he again fall into the power of the Florentine ftate. The poet, after this, may be traced to Padua, Urbino, Bologna, and various other places. When Henry of Luxembourg was elected emperor, Dante fedulouflly paid his court to him, in hopes that by his means he might be reftored to his country: but the death of Henry in 1313 cut off all the hopes of Dante.

About this period he went to Paris, where he engaged in the ftudies of the univerfity. He here made a literary difplay of his talents by holding a folemn difputation on fome theological queftions, in which, according to the manners of the age, he was well verfed. From this time he feems to have roved about Italy in an indigent and diftreffed condition, till he was hofpitably received by the lord of Ravenna, a patron and proficient in letters. By him Dante was employed in fome political negociations, and was fent to Venice, in order to compromife a quarrel which had arifen between him and the republic. The Venetians, however, refufed to admit Dante to an audience, by which he was fo much affected, that foon after his return to Ravenna, he died on the 14th of Sept. 1321. Funeral honours and a fplendid monument were given him by his patron, who alfo pronounced an oration over the dead body. A new and more fumptuous monument was erected to his memory in 1780, by the legate cardinal Gonzaga, bearing the following infcription: "Danti Aligherio, poetæ fui temporis primo, Reftitutori politioris humanitatis."

The Florentines now began to be afhamed of their enmity to this great man: they made many efforts to obtain his remains, in order to pay them that refpect and honour which they merited; and Michael Angelo offered to execute, gratuitoufly, a monument which fhould be worthy of the poet. But Ravenna would not grant them the honour. The fame of Dante did not, however, depend on marble or brafs: his "Divina Commedia" has given him an unfading and immortal reputation. The fubject of this work is the defcription of a vifion in which the author is led through hell, purgatory, and paradife; it is full of extravagances, but it contains a variety of paffages of fingular ftrength and fublimity. The admirers of this poem contend

contend that no work of Italian poetry bears such a stamp of original and sublime genius; and that in grandeur of conception, warmth of feeling, and energy of expression, no composition of modern times can compare with it. Scarcely had this poem appeared, before it became the object of universal admiration throughout Italy: copies of it were multiplied, and commentaries written for its illustration. Its first expositors were the sons of the poet; and in 1373 a professorship was established at Florence, for the express purpose of explaining Dante to the public: the first person who filled the chair was Boccacio. The best edition is that of Venice, in three vols. quarto, published in 1757. Boccacio has described Dante as of a middle stature; of a pensive and melancholy expression in his countenance. His gait was composed, his manners grave and sedate, his address courteous and civil, his way of living extremely temperate. He is said to have been a very absent man, of which instances have been recorded; once meeting with a book in an apothecary's shop, which he had been long looking for, he opened it, and read from morning to night without being roused from his pursuit by the distraction and tumult occasioned by a great wedding passing through the adjacent street. Dante was a considerable writer in the Latin as well as in his own language: but his "Commedia" is the only work to which he is indebted for celebrity. Gen. Biog. Moreri.

DANTÉ, IGNATIUS, an Italian mathematician of the 16th century, a native of Perugia, was descended from a family eminent for their knowledge of the sciences. His father was a mathematician and an architect, and he himself applied so assiduously to the study of mathematics, that he was invited to Florence by the grand duke Cosmo: here he was treated with the utmost liberality; and here he left, as monuments of his fame, a marble quadrant, an equinoctial and meridian line on the front of the church of St. Maria Novella. He removed to Bologna after the death of Cosmo, where he was appointed mathematical professor, and here, in the church of Saint Petronius, he traced the meridian, which was completed by Cassini. He was afterwards employed by pope Gregory XIII. in reforming the calendar, and in the construction of the maps of Italy in the Vatican gallery. For this labour he was presented with the bishopric of Alatri, which he did not enjoy any length of time. He died Oct. 19, 1586, at the age of 49, leaving behind him some mathematical treatises. Gen. Biogr. Moreri.

DANTE, JEAN BAPTISE, native of Perugia, a mathematician, who flourished towards the end of the fifteenth century. He is said to have invented a method of making artifical wings, so well proportioned to the weight of the body that he was able to fly: he made many successful experiments, but at length one of his wings failed him, when he was exhibiting at a grand spectacle; he fell upon the church of Notre Dame, and was seriously wounded. He, however, recovered under the hands of an able surgeon, and afterwards taught the mathematics at Venice. He died at the age of forty. Moreri.

DANTELLE', in *Heraldry*, the same with danché, or rather with dancetté, *viz.* a large open indenture. See DANCETTE.

DANTHELETÆ, in *Ancient Geography*, a people who, according to Ptolemy, inhabited Thrace. This author assigns them the town of Pantalia.

DANTZIC, or DANTZICK, in the Polish language *Gdantzk*, in German *Danzig* or *Dantzig*, in Latin *Gedanum* or *Dantiscum*, in *Geography*, an ancient and large city of Polish or Western Prussia, in that part which, from having anciently belonged to the duchy of Pomerania, has retained the name of Little Pomerania or Pomerellia, is seated on the least of the several branches of the river Vistula, which form the islands called the *Dantziger Werder*. Hence large vessels have not depth of water sufficient to come loaded into the harbour, although Dantzic is but four miles from the place where the Vistula falls into the Baltic sea. The harbour at the town admits only ships of one hundred tons burthen; those of greater burthen deliver and receive their cargoes at Weixel or Weichsel Munde, *Vistulæ Ostium*, the mouth of the Vistula; and when the weather is calm, in Dantzic road, called the *Fahrwasser*, which is from eight to fifteen fathoms deep.

The city of Dantzic is bounded on the East by the Vistula, on the south by the kingdom of Prussia, on the north by the Baltic sea, and on the west by the duchy of Pomerania, which belongs to the king of Prussia. It is situated in E. long. 18° 36′, and N. lat. 54° 22′ 23″ twenty-four miles N. W. of Marienburg, and thirty-two N. W. of Elbing, 76 miles N. of Thorn, 150 N. W. of Warsaw, 260 N. of Cracow, 220 N.E. of Breslau, 80 miles S.W. of Konigsberg, 260 S.W. of Riga, 900 N.E. of Paris, and 540 S.W. of St. Petersburg. Two small rivers, the Radaun and Motlau, run through the city, which is divided into three towns, the Vorstadt (Fore town), Altstadt (Old town), and Reichsstadt (Imperial town,) with their respective suburbs. St. Albrecht or Albert, Old Scotland, Stoltzenberg, Hagelberg, Bischofsberg, Schidlitz, Langefuhr, and New Scotland. Stoltzenberg which is situated on a high sandy hill, to the west by south, commands a fine view of the town and harbour, with the ships' road, even to the sea. But most of the suburbs were burnt down in 1806, when Dantzic was besieged by the French.

The circumstance of two of the suburbs of Dantzic being called Old and New Scotland, is owing to the signal services which a gentleman, of the Scotch family of the Douglas, rendered to the city whilst it was besieged by the Poles, in consequence of which the Scots obtained privileges that induced numbers of them to settle at Dantzic in the seventeeth century.

The corn magazines or granaries form a separate town of lofty buildings, divided into several streets. It has no communication with the city but by a large drawbridge, being completely encompassed by water, so that boats may load and unload at each granary's door. Few of these magazines are lower than five stories, and each story is provided with funnels or pipes to let down the corn from one chamber into the other. Not a single individual is allowed to lodge in this corn island, which is guarded at night by fierce mastiffs let loose by their keepers, who quit the isle soon after sun-set, when the bridge is drawn up.

The houses at Dantzic are of brick and stone, commonly five, six, or more stories high, with a sort of gallery called a *Beyschlag* on the outside of the ground floor projecting into the street, in the middle of which gallery there is an ascent of a few steps to the principal entrance of the house. Several streets have rows of trees on each side. The principal buildings are the cathedral, the guildhall, the arsenal built in 1606, the public weigh-house, and the exchange; but they are old structures generally more remarkable for their antiquity than for their elegance.

Dantzic was the first town of Poland that embraced the Lutheran persuasion in the year 1525. It counts fourteen Lutheran churches, two belonging to Calvinists, one to Roman Catholics, and before its surrender to the French, in 1807, it had also an English chapel. There are several hospitals and charitable foundations

Cluverius, or Cluvier, the celebrated geographer, is the most illustrious learned man that was born at Dantzic, although

though it boafts of a gymnafium or academy which has feveral profeffors; of an extenfive public library, and of a fociety for promoting the ftudy of natural hiftory.

In 1709, Dantzic was feverely vifited by the plague, which fwept off above 40,000 of its inhabitants; yet their number, in 1730, is faid to have approached 200,000. But this computation is evidently erroneous, for in the year 1752, when the trade of Dantzic was fo flourifhing that 1014 fhips entered inwards, Bufching ftates the number of deaths to have been only 1846, which, calculating even at one in fifty, gives but 92,300 inhabitants. In the year 1774 Ludwig von Baczko, a very refpectable Pruffian author, eftimates the population of Dantzic at 50,000. In 1802, nine years after it had been forced to fubmit to the king of Pruffia, Dantzic contained 47,000 inhabitants, befides the garrifon; and in 1804, including the garrifon, its whole population amounted to 60,097.

Dantzic was formerly at the head of the Hanfeatic league in the north. Towards the end of the fourteenth century its trade was confiderable, having already engroffed all the foreign commerce of Culm and Thorn. Before the difaftrous war of 1806, its own fhipping was numerous, and more than 1000 fhips were reckoned to enter inwards annually: but in that unfortunate year the number of veffels arrived was only 379, and of thofe that failed 408. In the year 1803 there entered into the feveral ports of Great Britain only, 204 fhips from Dantzic.

The principal ftaple commodity is corn of all forts bought up in Poland, of which Dantzic fhips annually from 40 to 50,000 lafts. It alfo exports oak planks, timber, ftaves, wax, honey of a fuperior kind, hemp and flax, yarn, potafs, cordials, a large quantity of fpruce beer, known in England by the name of black beer, and a variety of other articles. Its principal manufactures, befides the diftilleries and breweries, are thofe of faltpetre, potafs, woollen cloth, hardware, and refined fugar.

According to Bufching, it appears from ancient records that, fo early as the year 997, Dantzic was a confiderable commercial town; it is, however, generally fuppofed that, till the year 1164, it confifted only of fome fifhermen's cottages; that Mafleirn the fecond duke of Pomerania, dying without male iffue, left it to Primiflaus, king of Poland, who annexed it to the crown, and in 1295 erected it into a city. In 1310, the knights of the Teutonic order rendered themfelves mafters of Dantzic, and by them it was firft walled round in 1343. In the year 1454 Cafimir IV., king of Poland, reconquered Dantzic, and granted great privileges to the citizens, who afterwards, in defence of the Lutheran confeffion, fided with Maximilian of Auftria againft the Poles, which provoked king Stephen Battori to befiege Dantzic in 1577; but, by the mediation of other princes, the citizens were reftored to all their former immunities and liberties in 1597. In the year 1632 Dantzic was made a member of the ftate in the Polifh diets, and admitted to a vote on the election of a king of Poland. For a long feries of years Dantzic continued a free republic, with a territory of above 40 miles in circumferance, under the protection of Poland. In 1655 Dantzic ftrenuoufly adhered to the intereft of John Cafimir V., king of Poland, whom Charles Guftavus of Sweden had unjuftly attacked, and by fhutting its gates to the invader, put a barrier to the victories of the Swedes, faved the kingdom of Poland, and occafioned five years after an honourable conclufion of the war, by the peace of Oliva in 1660.

The weaknefs of Dantzic, as a ftate, expofed it to frequent moleftations from the neighbouring powers, who often exacted from it large contributions; and though in 1706 the queen of England, the king of Pruffia, and the ftates of Holland, entered into a league to protect it, yet the czar, Peter I. of Ruffia, called twice on Dantzic for large fums.

In 1734 Staniflaus, king of Poland, took refuge in this city, which fubmitted to Auguftus III., only after Staniflans had made his efcape. From that time till the year 1752, Dantzic was frequently convulfed by ferious diffenfions between the magiftrates and the citizens, which terminated by the *Ordinatio regia civitati Gedanenfi præfcripta.*

At the firft partition of Poland, in 1772, the king of Pruffia, by obtaining Weft Pruffia, extended his dominions to the very gates of Dantzic, and even occupied fome of its fuburbs. This circumftance, and the eftablifhment of a cuftom-houfe at Fordon, where the king of Pruffia levied heavy tolls upon the articles that were brought from Poland to Dantzic, depreffed the commerce of this city to fuch an intolerable degree, that the expiring republic claimed the protection of Ruffia againft the oppreffions of Pruffia. Several diplomatical notes were exchanged in the years 1784 and 1785, but Dantzic obtained very little redrefs; and at the fecond partition of Poland in 1793, it acknowledged the Pruffian fway. Under the protecting influence of the then powerful kingdom of Pruffia, the trade of Dantzic revived, and had nearly regained its ancient importance, when the difaftrous war of 1806, between France and Pruffia, plunged this flourifhing town into a ftate of great diftrefs. At the approach of the enemy the fuburbs were burnt down, and, during a fiege of feveral months, about 3000 buildings in the town itfelf were confiderably damaged. The whole damage has been eftimated at ten millions of dollars, or nearly one million and a half fterling. At length the Pruffian general count Kalkreuth furrendered Dantzic, by capitulation, to the French marfhal Lefebvre, who on this occafion received the title of duke of Dantzic from the French emperor.

On the 10th of July, 1807, Dantzic recovered its old conftitution as a free republic under the protection of Ruffia, Saxony and Pruffia, and the territory which it had poffeffed before the year 1772, being nearly fifteen miles in extent round the city, befides the Dantzic Werder, and the Dantzic or Frifche Nehrung. The former is an uncommon fertile ifland formed by a branch of the Viftula and the river Motlau, containing twelve parifhes and thirty-three villages. The latter is a narrow flip of land between the Frifche Haf and the Baltic fea, 50 Englifh miles long and not more than two miles and a half broad in its greateft breadth, containing five parifhes.

Agreeably to its former conftitution Dantzic was divided into three cities, each of which had its particular burgomafter or major. Thefe three burgomafters, a limited number of aldermen, and a common council of one hundred citizens, elected promifcuoufly out of the three cities, formed together one fenate, to which all matters relating to the government of the republic were referred. How far this conftitution is at prefent acted upon, it is difficult to know; Dantzic having ftill a French garrifon, which it is to retain till a general peace, or at leaft what is termed a maritime peace between Great Britain and France, takes place. In the mean time trade is at a ftand, and there is every reafon to fuppofe that the inhabitants of Dantzic are fubject to the martial law of the French, or nearly fo. The French general Rapp is governor of the place. His proclamations take precedency of the decrees of the Dantzic fenate, which till this moment has not diftinguifhed itfelf

by

by any tranfaction that characterizes a perfectly independent ftate.

DANTZIGERS, or Prussians, in *Ecclefiaftical Hiftory*, a fect of the refined anabaptifts (fee Flemingians), fo called on account of their adopting the manners and difcipline of the Pruffians.

DANUBA, in *Geography*, a town of Africa, in the kingdom of Tomani.

DANUBE, *The*, in German the *Donau*, is the moft confiderable river of Germany, its courfe, without reckoning its windings, being computed at 1620 miles. It has its fource near the fmall town of Donefchingen, in the court-yard of the palace of the princes of Furftenberg; and although the two fmall rivers of Bribach and Brege, which unite below the town, are far more confiderable than the ftreamlet that flows into them from Donefchingen foon after their junction, yet this little ftream alone has the hononr of being acknowledged as the fource of the mighty Danube. Two celebrated Swifs writers, Sceuchzer and Fæfi, have contended that the Danube rifes in Swifferland, becaufe the river Inn, which actually has its fource in the canton of the Grifons, is 890 feet wide at the place where it joins the Danube, whilft the width of the latter is only 784 feet. But the rivulet which comes from Donefchingen has the name of the Danube, or Donau, long before it reaches the river Inn; and admitting that the Danube is narrower and cramped up by hills where it meets the Inn, it is yet certain that it contains much more water upon equal ground, and is already a much mightier river than the Inn far above Ratifbon, even before it has received four fmaller rivers. Suabia, therefore, is the true birth-place of the majeftic Danube, with which only the Volga, amongft the European rivers, can vie.

The Danube is one of the few rivers that flow from eaft to weft. From its fource it runs N.E. to Ulm, where, in the month of October, 1805, it overflowed its banks, with a violence which had been unparalleled fince the time of Louis XIV., particularly in the night that preceded the difgraceful capitulation of general Mack.

From Ulm the Danube continues its north-eaft courfe to Ratifbon, from whence it runs fouth-eaftwards to Deckendorf, where it receives the river Ifer. It was here that Dr. Burney entered the Danube, on his aquatic excurfion from Munich to Vienna. This fouth-eaft courfe goes on to Vilohofen, where there is a wooden bridge of fixteen arches. In this part the Danube abounds in rocks, fome above water, and fome below, which occafion a great noife, owing to the rapidity of the current running over or againft them. The fame courfe holds to Paffau; at the end of which town there is a confluence of three rivers, the Inn on the right hand, the Iltz on the left, and the Danube in the middle. After this junction, the Danube becomes more and more rapid; the fhore on each fide, for a confiderable way below Paffau, has high hills and rocks, covered with fpruce fir-trees, and box.

As far as Ingelhartzeil, or the entrance into Auftria, the Danube is compreffed and fhut up between two high mountains; and fometimes the noife againft rocks is as loud and as violent as a cataract. The river continues running through a woody, wild, and romantic country. For fifty miles not a corn-field or pafture is to be feen. At Afha the country opens a little. Here river after river comes tumbling into the Danube, and yet it grows rather more deep than wide by thefe acceffions; many fmall rivers detach themfelves again from it; and iflands are frequently formed in the middle of this world of waters.

Towards Lintz the Danube runs almoft full eaft, through a flat country, with high mountains covered with trees at a diftance. At Lintz there is a bridge over the Danube of twenty very wide arches.

At Spieburg there is a water-fall. Ens is here in fight upon the right hand. The courfe of the Danube now becomes extremely irregular, and inclines a while to the fouth, and then to N.E. The river is fometimes like a fea, fo wide, that there is fcarce any land in fight; at other times it is broken and divided into fmall ftreams by iflands.

At Strudel, which is fituated in a very wild country, is the famous water-fall and whirl-pool, which, in winter, often proves fatal to boats that are drawn into its vortex. At Ips the country opens, and is very beautiful. Beyond Melk the country grows more and more wild as far as Stein. The rocks are often fo high on each fide of the Danube, as to prevent the fun from being feen. At Stein, which is on the left of the river, there is a wooden bridge of twenty-five wide arches, which leads to Krems on the right-hand of the Danube.

As the Danube rolls on to the S.E. towards Vienna, the country becomes lefs favage. The vine grows on the hills, and innumerable iflands divide the Dannbe.

From Vienna the Danube flows to the S.E. towards Prefburg, and below the town of Haimburg quits Auftria and Germany to enter Hungary. From Prefburg to Comorn it continues to the eaft, but afterwards flows to the fouth, and even a little to the fouth-weft, and then again fouth-eaft, towards Belgrade and Widdin, when it runs on eaftwards, dividing Bulgaria from Wallachia, and difcharges itfelf at laft by feveral channels into the Black fea, in the province of Beffarabia. It is fo deep between Buda and Belgrade, that men of war have been navigated upon it, and yet it is not navigable to the Black fea, on account of the cataracts.

The Danube abounds in fifh, particularly the *hufo*, Ifin. in Latin *antacæus*, in the Ruffian language *beluga*, of which is made the glue known in commerce by the name of *ifinglafs* in Latin *ichthyocolla*; but this fifh is much more plentiful in the Volga.

The Danube is fuppofed to have been the northern boundary of the Roman empire in Europe; towards its mouth the ancients called it the *Ifter*; which fee.

The courfe of the Danube, with regard to its length, compared with the Thames, is as 7 to 1, or fix times longer than the Thames.

Danube, in *Mythology*, a river worfhipped by the Scythians, on account of the great extent of its water. This river deity is exhibited on a medal of Trajan, fitting with his urn, and diftinguifhed by a large veil floating over his head: but the fineft figure of him is to be feen on the column of Trajan at Rome. Mr. Spence (Polymetis) fays, that he is one of the firft figures on that column, very near the bafe; and that he appears there, from the waift upward, rifing out of his ftream, to fhew his duty to the Romans, and to fupport the bridge of boats, which they had laid over it. The hand of the god may be difcerned, though partly covered with the water, ftretched quite to the bridge, and fome way under it, as willing to fupport it.

DANUM, in *Ancient Geography*, a town of Albion, marked in Antonine's Itinerary between Segelocum or Agelocum, and Legeolium. It is the prefent Doncafter.

DANVERS, in *Geography*, a townfhip of America, in the ftate of Maffachufetts and county of Effex, adjoining Salem on the N.W. in which it was formerly comprehended by the name of Salem village. It confifts of two parifhes, and contains 2643 inhabitants; and it was incorporated in 1757.

1757. The moft confiderable and compact fettlement in it is formed by a continuation of the principal ftreet of Salem, which extends more than two miles towards the country, having many work-fhops of mechanics, and feveral for retailing goods. Large quantities of bricks and coarfe earthen ware are manufactured here. Another pleafant and thriving fettlement lies at the head of Beverly river, called New-Mills, where a few veffels are built. The town of Danvers receives an annual compenfation of 10*l.* from the proprietors of Effex bridge, on account of the obftruction of the river. A flitting tide-mill was erected here in 1797. On the fame dam are a grift-mill, an anchor fhop, a fcythe-fhop, whofe hammers are carried by water, and a fhovel-manufactory.

DANVILLE, a thriving poft-town of America, in Mercer county, and formerly the metropolis of Kentucky, pleafantly fituated, in a large fertile plain, on the S.W. fide of Dick's river; 35 miles S.S.W. of Lexington. It confifts of about 50 houfes, and a Prefbyterian church, and contains 270 inhabitants, of whom 101 are flaves. N. lat. 37° 30′. W. long. 85° 30′.—Alfo, a very thriving townfhip in the ftate of Vermont, and county of Caledonia; it was a few years ago a wildernefs, and now contains 1544 inhabitants; 8 miles N.W. of Barnet.—Alfo, a thriving poft-town in Pittfylvania county, and ftate of Virginia, fituated on Dan river, on the main road from Philadelphia to the Moravian town, N. Carolina.—Alfo, a poft-town of Northumberland county, in Pennfylvania, on the Sufquehanna, at the mouth of Mohoning creek; 12 miles above Northumberland.

DANYCLOW, a town of Poland, in the palatinate of Lemberg; 64 miles E. of Lemberg.

DANZI, Mademoiselle, afterwards *Madame* le Brun, in *Biography*, with many excellencies, an extenfive compafs of voice, a good figure, and a great knowledge of mufic, was cold and uninterefting in her performance. She was an admirable inftrumental performer on the piano-forte, in Emanuel Bach's ftyle, and had more expreffion with her fingers than voice.

DAOLA, in *Mythology*, a Tonquinefe idol, who prefides over travellers.

DAON, in *Geography*, a town of France, in the department of the Mayenne, and diftrict of Chateau-Gontier; 2 leagues S. of Chateau-Gontier.

DAONA, in *Ancient Geography*, a town and alfo a river of India, on the other fide of the Ganges. Ptolemy.

DAONUS, or Daos, in *Mythology*, a deity of the ancient Chaldæans.

DAOULAS, or Doulas, in *Geography*, a fmall town of France, in the department of Finifterre, and chief place of a canton, in the diftrict of Breft. It has but 440 inhabitants. The canton, which has an extent of 235 kiliometres and 10 communes, contains a population of 13,799 individuals.

DAOURIAN Mountains, mountains of Afiatic Ruffia. See Nershinsk.

DAOURITA. See Schorl.

DAPALIS, in *Mythology*, an epithet of Jupiter, deduced from the great feftivals celebrated in honour of him.

DAPHNÆ, Pelusiæ, in *Ancient Geography*, a town of Egypt, 16 miles from Pelufium, on the route from Memphis, near the canal of Pelufium formed by the Nile.

DAPHNÆUS, in *Mythology*, an epithet of Apollo, deduced from the fable of his amours with Daphne.

DAPHNE, Δαφνη, in *Antiquity*, a kind of divination, taken from the crackling of laurel leaves thrown into the fire.

Daphne, in *Botany*, (after the nymph Daphne, in allufion to her transformation into a laurel; fome of this genus having the afpect of laurels. Linnæus, it feems, originally defigned this name for his *andromeda polifolia*; but having found fo apt a denomination for that plant, he applied *daphne*, as it remains at prefent, to the *thymelæa* of Tournefort, the latter name being, according to his rules, untenable, as compounded of another eftablifhed one, *thymus*.) Linn. Gen. 192. Schreb. 260. Willd. Sp. Pl. v. 2. 415. Juff. 77. Clafs and order, *octandria monogynia*. Nat. Ord. *Thymelææ*, Juff.

Gen. Ch. *Cal.* of one leaf, funnel-fhaped; externally rude; internally coloured; its tube cylindrical; border four-cleft, fpreading, fhorter than the tube, deftitute of glands or crown at the bafe. *Cor.* none. *Stam.* Filaments eight, inferted in two rows into the tube, and enclofed within it, very fhort; anthers roundifh, erect. *Pift.* Germen, ovate, fuperior; ftyle very fhort; ftigma capitate, depreffed. *Peric.* Drupa roundifh, coloured, juicy, of one cell. *Seed* folitary. Some fpecies are diœcious.

Eff. Ch. Cal. coloured, funnel-fhaped, four-cleft, withering, including the ftamens. Cor. none. Drupa of one feed.

About 30 or more fpecies of this elegant genus are known, fome of which have a lateral, others a terminal, inflorefcence. Their habit is fhrubby, tough and flexible, often filky; their inner bark invariably compofed of fine fattin-like white, and fhining fibres. Leaves fimple, moftly ever-green, without ftipules. Flowers more or lefs clustered, externally rude, filky, and frequently greenifh; internally fmooth, red, white, or yellowifh; for the moft part highly and agreeably fcented. Fruit red or black. Every part of thefe plants is highly acrid; and hence they have, in confideration moreover of their habit, obtained the names of fpurge-laurel, and fpurge-olive. D. *mezereum*, common mezereon, Engl. Bot. t. 1381, found apparently wild in fome parts of England, belongs to the firft fection (flowers lateral), and is frequent in gardens. The leaves are fmooth, deciduous, and come after the flowers, which are crimfon, occafionally white, and appear in the early fpring. Their fragrance is fo ftrong as to be, to fome perfons, intolerable in a room. The bark of the root efpecially, is ufed in medicine as a powerful ftimulant. This fpecies is propagated by feeds, or by fuckers from the root. D. *alpina*. (D. altaica, Pallas, Roff. t. 35.), is another hardy fpecies, a native of the Alps, eafily raifed from feeds in our gardens, efpecially in bog-earth. Its flowers are white and fweet-fcented. Leaves deciduous, fmoothifh. D. *laureola*, fpurge-laurel, Eng. Bot. t. 119, is frequent in fhady woods and thickets. Its flowers are green, and ill-fcented. Berries black. The tuft of fhining leaves, crowning the naked ftem, gives this fhrub an elegant palm-like afpect. D. *pontica*. Andr. Repof. t. 73, firft found by Tournefort in the Levant, and figured in his voyage, has of late become frequent in our gardens, where it is very hardy, and very acceptable. The leaves are ever-green. Flowers copious, early, greenifh-yellow, exhaling in the evening a rich, pungent, lemon-like odour.—Of thofe with terminal flowers, D. *odora*, Sm. Exot. Bot. t. 47, is remarkable for its fweet white bloffoms. In order to have them in perfection, the heat of a ftove, in the autumn and winter, is requifite; otherwife the plant itfelf is almoft hardy enough to bear our climate; but it fcarcely ever flowers in the open ground. D. *collina*, Sm. Spicil. t. 18. Curt. Mag. t. 428. Neapolitan mezereon, is very able to bear our hardeft winters, though an ever-green, and a native of Italy, Greece, &c. Its fweet rofe-coloured flowers, produced in fpring, or even in the winter, if mild, and its dark-fhining leaves,

leaves, filky beneath, render this a very defirable plant. It is increafed by budding on D. *laureola*, or by feeds. D. *cneorum*, Curt. Mag. t. 313, an elegant and fragrant Alpine fhrub, is rather more difficult to keep in a garden. It requires bog-earth, and regular moderate fupplies of water. D. *lagetto* produces a kind of lace from the artificial extenfion of its inner bark. It it a native of Jamaica.

Daphne, in *Gardening*, comprehends plants of the low, fhrubby, ornamental, ever-green, and deciduous kinds; of which the fpecies moftly cultivated are the mezereon (D. *mezereum*); the wood, or fpurge laurel (D. *laureola*); the filver-leaved daphne, or tartouraira (D. *tartouraira*); the trailing (*daphne cneorum*); and the fweet-fmelling daphne, (D. *odora*).

Method of Culture.—Thefe plants are capable of being raifed in different methods, according to the kind and nature of them.

The firft fort and varieties are beft propagated by fowing the feeds or berries, as foon as they have become perfectly ripe, as about Auguft, on beds of light fandy earth, covering them in to the depth of half an inch. When poffible, a fouth-eafterly afpect fhould be chofen. And, to preferve the feeds in a perfect ftate, the fhrubs fhould be netted in the latter end of the fummer, to prevent the attacks of the birds, by which they are very liable to be injured.

The young plants generally appear in the following fpring, when they fhould be kept clear from weeds, and the largeft ones removed when too clofe together: they may remain in thefe beds till the beginning of the fecond autumn, when they fhould be removed, and fet out in nurfery-rows, at the diftance of a foot and a half, and ten or twelve inches in the rows, great care being taken not to break or injure their roots. After they have had two years' growth in thefe fituations, they are in a proper condition for being planted out where they are to remain: and as the plants flower very early in the fpring, the beft time for removing them is in the early part of the autumnal feafon.

The plants grow to the greateft fize, and flower in the moft full and perfect manner, when the foils are of a dry quality: as in moift adhefive foils they are apt to become moffy, and grow in a very imperfect manner.

The fecond fpecies may be increafed by fowing the feeds in the fame manner as the above; and alfo by cuttings and layers of the young fhoots; thefe fhould be planted out or laid down in the beginning of the autumn, and in the following autumn they will be well rooted: the layers may be taken off and planted where they are to remain, or put into nurfery-rows as above. The cuttings may, likewife, be treated in the fame way.

And the third and fourth forts fucceed beft when raifed from feed procured from abroad, and fown on a warm dry fituation, in the early autumn, in the places where the plants are to remain, as they do not bear tranfplanting well. The ground fhould be as little as poffible ftirred about the plants. The former fhould have a dry warm afpect, where the land is poor, but the latter fucceeds in fuch as are more cool: thefe plants are fufficiently hardy to fucceed in the open air, when the winters are not very fevere.

The laft fort is raifed by fowing the feeds, procured from its native fituation, on a gentle hot-bed, in the autumn or fpring, and when the plants are of fufficient growth, removing them into feparate pots, to be placed under the protection of the green-houfe. It is much more tender than the other forts, not being capable of bearing the open air in cold weather.

The firft and fecond kinds are highly ornamental plants in the clumps, borders, and other confpicuous parts near the houfe; the former flowering early; and, where many are together, affording a fine fragrance.

The other forts, though more tender, are curious, and afford an agreeable variety, in affemblage with others of fimilar growth, either in the borders, or among potted plants.

Daphne *Mezereum*, in *Pharmacy*. Many parts of the mezereon are diftinguifhed for their extreme acrimony, efpecially the berries and bark both of the trunk aud root. It is the root which is employed in medicine.

When a piece of the root is chewed, at firft it appears equally without tafte as fmell; but after a time, a fenfe of heat and pungency in the fauces comes on, which increafes to a painful degree, and is remarkably permanent, often remaining for many hours, and not to be wafhed away or removed. This pungency is fo intenfe in the berry or frefh bark, as to corrode the cuticle of the tongue and fauces, and when it has fubfided, an infenfibility of thefe organs remains for fome time.

Two ounces of the bark digefted with hot water affords, (according to Murray,) about two drams of a gummy extract, and with fpirit, 48 grains of refin. Both thefe preparations poffefs the acrimony of the entire plant.

The mezereon root was firft introduced into this country as an ingredient in the compound decoction of farfaparilla or Lifbon diet drink, and was afterwards employed alone in the cure of venereal nodes by Dr. Ruffel. The formula which he gives, and which has been adopted by the Edinburgh college, is two drams of the mezereon, and half an ounce of liquorice-root boiled with three pints of water down to a quart. From four to eight ounces of this decoction may be given four times a day. This medicine produces fcarcely any fenfible effect except a moderate heat in the mouth as already mentioned, and fometimes it excites perfpiration.

The mezereon has alfo been ufed with advantage in rheumatic complaints, and in feveral obftinate cutaneous affections.

The bark of the mezereon is in popular ufe in France, as a ftimulant application to the fkin, to excite a ferous difcharge, which it effects, without actually bliftering; a practice which deferves a further trial, and might often fuperfede with advanntage fome of the ftimulating plafters and unguents now in ufe. A piece of the bark, cut of the required fize, is fteeped for a fhort time in vinegar, and then bound upon the fkin. It fhould be renewed every day. It is apt, however, to produce eruptions on the contiguous fkin.

Daphne, in *Geography*, a river of Paleftine which runs into the Leffer Jordan, at fome diftance from lake Samochonites.

Daphne, a very confiderable village of Afia, in Syria, fituated on the river Orontes, near its mouth in the Mediterranean, reckoned a fuburb of Antioch, though at the diftance of 4 or 5 miles from it. Here Seleucus planted a thick grove of laurels and cypreffes, reaching 10 miles in circumference, and forming in the moft fultry fummer a cool and impenetrable fhade. In the middle of the grove he erected a magnificent temple which was confecrated to Apollo and Diana, and he made the whole an afylum. Daphne was the fame with refpect to Antioch that Baiæ was to Rome, and Canopus to Alexandria, a place of refort for amufement and pleafure. Here a thoufand ftreams of the pureft water, iffuing from every hill, preferved the verdure of the earth, and the temperature of the air; the fenfes were gratified with harmonic founds, and aromatic odours; and

and the tranquil grove was devoted to Bacchus and Venus, to health and joy, to luxury and love. With regard to voluptuous gratification and enjoyment, it was ſo infamous that "Daphnicis moribus vivere," *i. e.* to live after the manners of Daphne, became a proverb, expreſſing the moſt luxurious and diſſolute mode of living; and all that had any reſpect for modeſty and virtue avoided the place. The ſoldier and the philoſopher wiſely ſhunned the temptations of this ſenſual paradiſe, where pleaſure aſſuming the character of religion, imperceptibly diſſolved the firmneſs of manly virtue. Caſſius, the Roman general, when he came to Antioch, prohibited his ſoldiers, by public proclamation, and under penalty of being caſhiered, from viſiting Daphne, that they might not be corrupted by its luxury and debaucheries. Neverthelefs the groves of Daphne continued for many ages to attract the veneration of natives and ſtrangers; the privileges of the holy ground were enlarged by the munificence of ſucceeding emperors; and every generation added new ornaments to the ſplendour of the temple. When Julian, on the day of the annual feſtival, haſtened to adore the Apollo of Daphne, his devotion was raiſed to the higheſt pitch of eagerneſs and impatience. His lively imagination anticipated the grateful pomp of victims, of libation, and of incenſe; a long proceſſion of youths and virgins, clothed in white robes, the ſymbols of their innocence; and the tumultuous concourſe of an innumerable people. In his time there was an oracle at Daphne, which was deſtroyed by the Chriſtian emperors: and Julian complained, that inſtead of hecatombs of fat oxen, ſacrificed by the tribes of a wealthy city to their tutelar deity, he found only a ſingle gooſe, provided at the expence of a prieſt, the pale and ſolitary inhabitant of this decayed temple. The altar was deſerted, the oracle had been ſilenced, and the holy ground was profaned by the introduction of Chriſtian and funereal rites.

After Babylas, a biſhop of Antioch, who died in priſon in the perſecution of Decius, had reſted near a century in his grave, his body, by the order of Cæſar Gallus, was tranſported into the midſt of the grove of Daphne. A magnificent church was erected over his remains; a portion of the ſacred lands was uſurped for the maintenance of the clergy, and for the burial of the Chriſtians of Antioch; and the prieſts of Apollo retired, with their affrighted and indignant votaries. As ſoon as another revolution ſeemed to reſtore the fortune of Paganiſm, the church of St. Babylas was demoliſhed, and new buildings were added to the mouldering edifice, which had been raiſed by the piety of Syrian kings. Julian was anxious to deliver the oppreſſed deity from the odious preſence of the dead and living Chriſtians; the bodies were decently removed; and the miniſters of the church were permitted to convey the remains of St. Babylas to their former habitation within the walls of Antioch. The return of the ſaint was a triumph; and the triumph was an inſult on the religion of the emperor, who exerted his pride to diſſemble his reſentment. During the night which terminated the proceſſion that accompanied the removal of the relics of St Babylas, the temple of Daphne was in flames; the ſtatue of Apollo was conſumed; and the walls of the edifice was left a naked and awful monument of ruin. It was ſaid, however, by the Chriſtians at Antioch, that the powerful interceſſions of St. Babylas had pointed the lightnings of heaven againſt the devoted roof; but Julian aſcribed the fire of Daphne to the revenge of the Galilæans. For the diſcovery of the criminals ſeveral eccleſiaſtics were tortured; and a preſbyter of the name of Theodoret was beheaded by the ſentence of the count of the Eaſt. But this haſty act was blamed by the emperor, who lamented, with real or affected concern, that the imprudent zeal of his miniſters would tarniſh his reign with the diſgrace of perſecution. Gibbon's Hiſtory, vol. iv.

Daphne, *Fountain of*, a fountain of Judæa, in the tribe of Naphtali. According to Steph. Byz. there was a town called Daphne in Lycia.—A ſea-port on the Euxine ſea had alſo this name.

Daphne, in *Mythology*, a nymph with whom Apollo is ſaid to have had an amour. Whilſt he was in purſuit of her, it is ſaid that ſhe was transformed into a laurel. The name is ſaid to be derived from Δαφονεω, *voco*, becauſe the laurel makes a crackling noiſe while it burns. The fable of the amours of Apollo and Daphne, is thus accounted for by Banier. Some prince, called Apollo, on account of his love of the belles lettres, falling in love with Daphne, the daughter of Peneus, king of Theſſaly, and being one day in purſuit of her, the young princeſs died upon the banks of a river in ſight of her lover. Some laurels ſpringing up on that ſpot gave riſe to her metamorphoſis; or rather the etymology of Daphne's name, which in Greek imports a laurel, was the foundation of the fable.

DAPHNELÆON, in *Medicine*, Δαφνελαιον (from δαφνη, the *bay tree*, and ελαιον, oil), *laurinum*, or oil of bay. This is prepared of the berries, when full ripe and ready to fall off, by boiling them in water; by which they tranſmit through their huſks a fat ſubſtance, which, after compreſſing the berries with the hand, is taken off with ſhells. Some, after they have inſpiſſated oil of unripe olives with cyperus, juncus odoratus, and calamus, caſt therein the tender leaves of the bay, and boil them together; and others add the berries, until it ſmells ſufficiently ſtrong; and ſometimes ſtyrax and myrrh are mixed with them. The mountainous and broad-leaved bay is the fitteſt for the preparation of this oil, which is beſt of its kind when recent, of a green colour, very bitter and acrimonious.

DAPHNEPHORIA, Δαφνηφορια, in *Antiquity*, a novennial feſtival, celebrated by the Bœotians in honour of Apollo.

At this feſtival a globe of braſs was ſet upon a branch of olive, from which hung ſeveral other ſmall globes; the firſt repreſented the ſun or Apollo; the ſecond, ſomewhat leſs in ſize, repreſented the moon; and the reſt, the ſtars. Crowns which encircled theſe globes pointed out the days of the year. This branch, with all its ornaments, was carried about in proceſſion by a young man, who held likewiſe in his hand a laurel-bough, and thence had the name "Daphnephoros." This youth, according to Pauſanias (in Bœot.), was to be choſen out of the beſt families, and to be well-formed, vigorous, and robuſt.

DAPHNOMANCY, from δαφνη, *laurel*, and μαντεια, *divination*; a kind of divination practiſed by throwing branches of laurel into the fire: the crackling of them was deemed a favourable omen; the contrary, otherwiſe. The leaves of laurel were alſo chewed, in order to communicate the gift of prophecy.

DAPHNUS, in *Ancient Geography*, a part of the canal of Conſtantinople, at the diſtance of 80 ſtadia from this city, and 40 ſtadia from the Euxine ſea. Arrian.—Alſo, a town of Lower Egypt, ſeated on a branch of the Nile, on the route from Peluſium to Memphis.—Alſo, a fort on the Danube, conſtructed by the emperor Conſtantine; and after being demoliſhed by the barbarians, repaired by the emperor Juſtinian.—Alſo, baths in Sicily, near Syracuſe.—Alſo, a ſea-port of Ethiopia, on the Arabic gulf.—Alſo, a town of the Opuntian Locrians, ſituated on the ſea-coaſt, near the frontiers which ſeparated the Opuntians from the Epicnemidian Locrians. It formerly belonged to the Phocæans.—Alſo, a river of Aſia Minor, in Caria.

DAPHNUSA, an ifland of the Ægean fea, placed by Pliny near thofe of Samos and Lefbos.

DAPHNUSIS, a lake of Afia Minor, in Bithynia.

DAPHTHITÆ, a people of Africa, placed by Ptolemy in the interior of Libya, at the foot of mount Atlas.

DAPIFER, the dignity or office of grand-mafter, or grand-fewer, of a king's or prince's houfehold.

The word is pure Latin, compounded of *daps*, *dapis*, a difh of meat ferved on the table, and *fero*, I bear; fo that dapifer literally fignifies a difh-carrier, or an officer who ferves the meats upon the table.

The title of dapifer was given by the emperor of Conftantinople to the czar of Ruffia, as a teftimony of favour. In France, the like office was inftituted by Charlemagne, under the title of dapiferat, and fenechauffe; to which was affixed the fuperintendance over all the officers of the houfehold.

In England the office of dapifer was lefs eminent; being found in feveral of our ancient charters named one of the laft of the officers of the houfehold.

The dignity of dapifer is ftill fubfifting in Germany. Till the year 1623, the elector palatine was dapifer, or grand-fewer of the empire: fince that time, the elector of Bavaria has affumed the title of arch-dapifer of the empire. His office is, at the coronation of an emperor, to carry the firft difh of meat to table on horfeback.

The feveral functions of a dapifer occafioned the ancients to give him divers names: as, ελεατρος, and eleater, dipnocletor, convocator, trapezopæus, architriclinus, progufta, prægustator, domefticus, megadomefticus, œconomus, majordomus, fenefchalius, fchalus, gaftaldus, affeffor, præfectus, or præpofitus menfæ, princeps coquorum, et magirus.

DAPIFERAT, Dapiferatus, the office of Dapifer.

DAPPLE, in *Rural Economy*, a term ufed to fignify marked with different colours as applied to animals; thus we have in horfes dapple, or dappled bays and grays.

Dapple *bay*, in the *Manege*, is ufed for a horfe which has marks of a dark bay colour. Such are alfo called bays à mirroir.

Dapple *black*, a black horfe, having fpots or marks blacker and more fhining than the reft of his fkin.

DAPS, in *Geography*, a river of Denmark, which runs into the Little Belt; 14 miles north-eaft of Haderfleben.

DAPSILES Coronæ, among the Romans, a kind of crowns or garlands worn by the women, which covered their faces, and ferved as a veil.

DARA, in *Ancient Geography*, a river of Afia, in Caramania, which falls into the Perfian gulf; called by Pliny *Daras*.—Alfo, a river of Africa, which difcharged itfelf into the Atlantic ocean, called by Ptolemy *Daratis*, and fuppofed to be the river Senegal of modern times.

Dara, a fortified town of Afia in Mefopotamia, 14 miles from Nifibis, and four days' journey from the river Tigris, was peopled and adorned by the emperor Anaftafius, from whom it derived the name of *Anaftafiopolis*. Dara has been amply defcribed by Procopius, who fays that it was traverfed by the river Cordes. The hafty works conftructed in this place, by order of Anaftafius, were improved by the perfeverance of Juftinian; and as a fpecimen of the military architecture of that age, we fhall give a brief defcription of it.

The city was furrounded with two walls, and the interval between them of 50 paces afforded a retreat to the cattle of the befieged. The inner wall was a monument of ftrength and beauty; it meafured 60 feet from the ground, and the height of the towers was 100 feet; the loop-holes, from which an enemy might be annoyed with miffile weapons, were fmall, but numerous; the foldiers were planted along the rampart, under the fhelter of double galleries, and a third platform, fpacious and fecure, was raifed on the fummit of the towers. The exterior wall appears to have been lefs lofty, but more folid; and each tower was protected by a quadrangular bulwark. A hard rocky foil refifted the tools of the miners; and on the fouth-eaft, where the ground was more tractable, their approach was retarded by a new work, which advanced in the fhape of an half-moon. The double and treble ditches were filled with a ftream of water; and in the management of the river, the moft fkilful labour was employed to fupply the inhabitants, to diftrefs the befiegers, and to prevent the mifchiefs of a natural or artificial inundation. Dara continued more than 60 years to fulfill the wifhes of its founders, and to provoke the jealoufy of the Perfians, who inceffantly complained, that this impregnable fortrefs had been conftructed in manifeft violation of the treaty of peace between the two empires. When Chofroes, the Perfian monarch, affumed the guard of the gates of Caucafus, he fufpended the demolition of Dara, on condition that it fhould never be made the refidence of the general of the Eaft. In his laft wars with the Romans, A. D. 572, &c., Chofroes conducted in perfon the fiege of Dara; and although that important fortrefs had been left deftitute of troops and magazines, the valour of the inhabitants refifted above five months, the archers, the elephants, and the military engines of the great king. During the reign of Chofroes II., the ftrong cities of Martyropolis and Dara were reftored to the Romans; and the Pefarmenians became the willing fubjects of an empire, the eaftern limit of which was extended, beyond the example of former times, as far as the banks of the Araxes, and the vicinity of the Cafpian.

Dara, or *Dra*, in *Geography*, a large river of Africa, which rifes in the Greater Atlas, not far from Tefza, and difcharges itfelf into the Atlantic, not far from Cape Non, enclofing a great part of the country called Mauritania Cæfarienfis.

Dara, or *Dra*, a province of the kingdom of Morocco, fo called from the river Dara, which paffes through it, and comprehending, according to fome modern authors, a great part of Biledulgerid. It is bounded on the north by the provinces of Morocco, Gezula, and Tafilet, on the eaft and fouth by Sahara, and on the weft by Sus. Some have eftimated its length at about 100 leagues. It contains a number of caftles, forts, and ftrong holds along the banks of the Dara. One of the chief towns is Benifabih, or Macabah, not far from which is Quiteoa, about 200 paces from the river, well defended by walls, and fortified by a citadel. Near this town is Tozarin, and at the diftance of about 20 leagus from Quiteoa is Tayamadert. On the banks of the Dara are Turzela and Margala; the former of which is faid to contain 4000 houfes, a caftle, and above 400 Jewifh families. Yinzulin is the largeft town of the province, fituated about 12 leagues from Jaragala, and ftrongly fortified by a citadel and walls. Timefguit, another of its towns, is fituated on the confines of Gezula, and contains within its walls about 3000 houfes, according to La Croix, and about 200 families in the fuburbs. The province of Dara is generally barren, though fome parts of it produce grain, efpecially after the overflow of its river. The whole province depends for the fubfiftence of its inhabitants, on corn and other neceffaries procured at Fez, in exchange for its indigo and dates. The inhabitants who are Arabians and Mahometans, are for the moft part of a very dark complexion, which is afcribed to their frequent alliances with the Negroes. The women, though fomewhat

what corpulent, are reckoned handſome; and their general diſpoſition is mild, and leſs ſavage than that of other females of the country. Some diſtricts of the country are dependent on the emperor of Morocco, to whoſe ſovereignty Dara is ſubject, though they are governed by their own ſcheiks.

DARAAN, or DARAUN, a town of Aſia, in Great Tartary; about 24 leagues E. of Samarcand.

DARABA, in *Ancient Geography*, a town of Ethiopia, placed by Strabo on the other ſide of the foreſt of Cumania, and in the vicinity of the country belonging to the people called Elephantophagi.

DARABGERD, or DARABGUIERD, in *Geography*, a town of Perſia, in the province of Farſiſtan, ſaid to have been founded by Darius; it is large, but not populous; and near it is found ſalt of various colours, white, black, red, and green. A conſiderable manufacture of glaſs is carried on in this place: 116 miles E S.E. of Schiras.

DARABITTA, in *Ancient Geography*, a village of Paleſtine, at the extremity of Galilee. Jonathan paſſed through it in his way from Tiberias to Jeruſalem.

DARADÆ, a people of Africa, in the interior of Libya, placed by Ptolemy on the coaſt of the weſtern ocean, in the environs of the river Daratis. Pliny calls them *Daratitæ*.

DARADAX, a river of Aſia, in Syria. We learn from Xenophon, that Beleſis, governor of Syria, had a large and beautiful park, and alſo a palace, near the ſource of this river. Cyrus cauſed the trees of the park to be cut down, and ſet fire to the palace.

DARADI, a people of Africa, in the interior of Ethiopia.

DARADUS, a river of Libya Interior.

DARAE, a people of Africa, in Libya, who formed a part of the Getulians, and inhabited a diſtrict very remote from the ſea.

DARAIA. See HANIFA.

DARAMAJON, a town on the north-weſt of the iſland of Java; 30 miles E. of Batavia.

DARAMPOORY. See DAREMPOORY.

DARAN, JAMES, in *Biography*, a French military ſurgeon, who acquired much celebrity for his ſkill in treating diſorders in the urethra, particularly for his improved method of making bougies, publiſhed in 1745, "Recueil d'Obſervations Chirurgicales ſur les Maladies de l'Urethra. It has been ſeveral times reprinted, and, in 1750, was tranſlated into Engliſh by Mr. Tomkyns, an eminent ſurgeon of London, who was able, he ſays, from his own experience, to atteſt the ſuperior utility of Daran's bougies over thoſe that had been commonly uſed. In the fifth volume of the "Journeaux de Medicine," there is a communication by Daran, in which he makes mention of a tube he had invented for drawing off the urine. This he deſcribes more particularly in his "Treatiſe on the Gonorrhœa Virulenta," firſt publiſhed in 1756. It is a flexible catheter, formed of a ſpiral wire, covered with the ſame compoſition as that uſed in making the bougies, and was capable of being introduced into the bladder, in many caſes, where it would have been dangerous, often impoſſible, to uſe the common catheter. Conſiderable improvements have been ſince made of this inſtrument, but the merit of the invention ſtill remains with Daran. Haller Bib. Chirurg.

DARANI, in the *Materia Medica*, a word uſed by ſome of the old writers to expreſs the ſal ammoniac of the times, which was the ſame with our ſal gemmæ.

DARAPORUM, in *Geography*, a town of Hindooſtan, in the Coimbetore country, 36 miles E.S.E. of Coimbetore, and 73 W. of Tritchinopoly. N. lat. 10° 42′. E. long. 77° 40′.—Alſo, a river of the ſame country, which has its ſource from an elevated plain about 60 miles in extent, which ſtretches acroſs the eaſtern mouth of the gap or valley encloſed between the branches of the Gauts, and riſes ſuddenly like a vaſt terrace, from the level of the ſurrounding country.

DARAPTI, in *Logic*, a mode of ſyllogiſm in the third figure, wherein the major and minor are univerſal affirmative propoſitions, and the concluſion a particular affirmative, E. gr.

DA "Every truly religious man is virtuous."
RA "Every truly religious man is hated by the world."
PTI "Therefore, ſome virtuous men are hated by the world."

DARBY, in *Geography*, a ſmall town in Delaware county, Pennſylvania, on the E. ſide of Darby creek, containing about 50 houſes and a Quaker meeting-houſe, and lying 7 miles S.W. by W. of Philadelphia. There are two townſhips of this name in the county, called Upper and Lower, from their relative ſituation.

DARDA, a town and fortreſs of Hungary, built by the Turks in the year 1686, and taken by the Imperialiſts in 1687; 30 miles S. of Bacs, and 44 S.S.E. of Zinget.

DARDANARIUS, *Uſurer*, *Monopoliſt*; a name anciently attributed to ſuch as cauſed a ſcarcity, and dearneſs of proviſions, particularly corn, by buying and hoarding it up to raiſe its value, and ſell it again at an extravagant rate.

The name Dardanarius was given from one Dardanus, who is ſaid to have made a practice of ſpoiling and deſtroying the fruits of the earth by a ſort of ſorcery. Hof. Lex. in voc.

The ſame people are alſo called æruſcatores, directarii, ſitocapeli, annonæ flagellatores, and ſeplaſiarii.

DARDANELLES, STRAITOF, in *Geography*, is ſituated 50 leagues to the weſt of Conſtantinople, between the Archipelago and the little ſea of Marmora, and extending from the coaſt of Troy to Gallipoli over againſt Lampſacus. This ſpace, about 12 leagues, of an unequal breadth, contains different points, in which the continents of Europe and Aſia, which this ſtrait ſeparates, approach to within the diſtance of three or four hundred fathoms. Three leagues from its mouth, on the ſide next the Archipelago, at the narroweſt part of the ſtrait, have been built in the year 1658, by Mahomet IV., the two caſtles called the Dardanelles; the cannon of each of which commanded the oppoſite ſhore. Theſe were, for a long time, the only barrier to ſecure Conſtantinople; but the Turks, becoming more fearful, though not more enlightened, built two others near the mouth; but as they are at the diſtance of 1500 fathoms, their fire is uncertain, and their defence inſufficient.

DARDANI, in *Ancient Geography*, a people of Illyria in Dalmatia, who inhabited the country called *Dardania*.

DARDANIA, a country of Aſia Minor, in the northern part of the Troade, when the kingdom of Troy ſubſiſted; but when this country was otherwiſe divided, it formed a part of the leſſer Myſia. It lay between the Helleſpont and the ſources of the Granicus. It took its name from Dardana, Dardania, or Dardanus, its capital; and its inhabitants were called *Dardanii* or *Dardanidæ*.—Alſo, a country of Illyria, in Dalmatia; the capital of which bore the ſame name.—Alſo, a name given to Mœſia Superior, on the ſide of the mountains which ſeparate this province from Macedonia Salutaris. Theſe mountains abounded with mines and mineral waters. Dardania was bounded on the eaſt by Pæonia, on the ſouth by Pelaconia, on the weſt by Dalmatia, and on the north by Dacia Ripenſis. In proceſs of time, they gave to this country the name of *Dacia Mediterranea*.—Alſo, a town of

of Afia Minor, in the Troade, called *Dardana*, or *Dardanus*. This town, the capital of Dardania, was fituated on the fea-coaft, near the Hellefpont, 16 miles from Troy, 8 miles N. from Abydos, and 8 miles S. from Rhetœum. It is pretended that it was founded by Dardanus, who had married the daughter of Teucer, king of this country; and Steph. Byz. fays, that it had been called Teucris. In this city, as Plutarch fays, peace was concluded between Mithridates and Sylla, the Roman general. This town gave name to the *Dardanelles*.

DARDANIS, a town of Africa, in the Pentapoli, placed by Ptolemy on the frontiers of Marmarica, near the promontory Zephyrium.

DARDANIUM PROMONTORIUM, a promontory of the Troade.

DARDANUS. See DARDANIA.

DARDANUS, a town of Italy, which, according to Lycophron, was furrounded by the waters of the marfh of Salpé.—Alfo, a town of Macedonia, mentioned by Lycophron, probably the fame with Dardania in Illyria.—Alfo a mountain of Spain in the Tarragonefe territory; fuppofed to be the moden *La Penna de Orduna*.

DARDESSEN, or DARDESHEIM, in *Geography*, a fmall town of the kingdom of Weftphalia, in the former principality of Halberftadt, which, till the peace of Tilfit in July 1807, belonged to the kings of Pruffia. It is fituated on an eminence called the Ortfberg, from which there is a capital view of the Hercynian foreft or the Hartz, and which is famous for quarries of excellent free-ftone.

DARE. See DACE and FISHING.

DAREA, in *Botany*, a genus of dorfiferous ferns, named by Juffieu in honour of Mr. Dare, an Englifh botanift of the time of Ray, one of the firft who found the *Hymenophyllum tunbridgenfe*, Engl. Bot. v. 3. t. 162. Bergius, who firft diftinguifhed this genus, which we now call *Darea*, denominated it *Cænopteris*, a *new fern*, a name to which we object, not only for its being compounded of another generic name previoufly eftablifhed, *Pteris*, which objection, though founded in Linnæan principles, feems in danger of being overruled; but even more on account of its abfurdity. See Sm. Introd. to Bot. 388. Dr. Swartz, however, has retained *Cænopteris*, perhaps thinking himfelf obliged in fome degree to do fo, out of refpect to its author, the founder of the new profefforfhip at Stockholm, which he himfelf fo worthily fills. We alfo entertain very high refpect for the botanical merits of Bergius, though few authors have been fo peculiarly unfortunate in the conftruction of generic names. We think alfo that the authority of Juffieu, as a leading fyftematic writer, may, though fubfequent to that of Bergius, be preferred to it. Juff. Gen. Pl. 15. Sm. in Mem. de l'Acad. de Turin, v. 5. 409. Tracts 233. (Cœnopteris. Berg. in Act. Nov. Petrop. v. 6. part. alt. 248. Sw. Fil. 87. Thunb. Prod. 172.). Clafs and order, *Cryptogamia Filices*; fect. *Annulatæ*. Nat. Ord. *Filices dorfiferæ*.

M. de Juffieu, G. Pl. 447, by an accidental error, refers the *Cænopteris* of Bergius to his *Myriotheca*, which is the *Marattia* of Swartz, but their characters are too different to caufe any confufion.

Eff. Char. *Capfules* in fcattered lines. *Cover* originating laterally from a vein, and feparating outwards. The habit of this genus is firm, fmooth, abundant in flender fubdivifions. Cover linear, membranous, entire, pale or brownifh. Capfules each embraced by a jointed ring. Its effential character is juft the reverfe of that of *Afplenium*, whofe cover opens inwardly, that is, always towards a rib or vein, and the habits of thefe two genera are fo different as to prove this a moft folid diftinction.

Sp. 1. D. *flaccida*. (Afplenium flaccidum; Forft. Prod. 80. Cœnopteris flaccida; Thunb. in Act. Nov. Petrop. v. 9. 159. t. D. f. 1, 2.) Frond loofely pinnate. Leaflets alternate, ftalked, lanceolate pinnatifid; fegments linear, uniform, undivided. Found by Forfter at Dufky bay in New Zealand. *Frond* fmooth, lax, of a pale green, fomewhat glaucous, two feet or more in height, lanceolate, with a long *ftalk*, loofely pinnated. *Leaflets* on flightly bordered ftalks; two or three of the lower pairs oppofite; the reft alternate; all lanceolate, pointed, long, pinnatifid, ferrated at the point; fegments alternate, linear. *Lines* of fructification folitary, running along the lower part of the inner-edge of each fegment; their *cover* originating from its midrib, and reaching nearly to the margin, fomewhat revolute when ripe. *Capfules* fmall, very numerous. 2. D. *auriculata*. (Cœnopteris auriculata; Sw. Fil. 87. Act. Nov. Petrop. v. 9. t. E. f. 2.) Frond pinnate, lanceolate. Leaflets oblong, obtufe, cut; fegments linear; the lowermoft cloven, auricled. Sw. A native of the Cape of Good Hope. 3. D. *odontites*. (Cœnopteris odontites; Sw. Fil. 87. Act. Nov. Petrop. v. 9. t. E. f. 1.) Frond doubly pinnatifid. Segments lanceolate, acute, the lowermoft cloven. Sw. A native of the Cape of Good Hope. 4. D. *rutæfolia*. (Cœnopteris rutæfolia; Berg. in Act. Nov. Petrop. v. 6. 249. t. 7. f. 2. Adiantum furcatum; Linn. Suppl. 447, excluf. fyn.) Frond pinnate. Leaflets once or twice pinnatifid; fegments linear-lanceolate. Main-ftalk fcarcely winged. A native of the Cape of Good Hope. *Frond* two feet or more in height, fmooth, pale, lanceolate, alternately pinnate. *Stalk* fmooth, fcarcely winged or bordered even at the very top. *Leaflets* ftalked, two or three inches long, broadeft at the bafe; doubly pinnatifid in their lower part, fimply pinnatifid upwards; fegments all uniform, and as nearly as poffible of an equal fize, linear-lanceolate, flightly incurved, entire, with a fhortifh *line* of fructification about the middle of their inner edge. 5. D. *furcata*. (Cœnopteris furcata; Berg. in Act. Nov. Petrop. v. 6. 249. t. 7. f. 1. Adiantum borbonicum; Jacq. Coll. v. 3. 286. t. 21. f. 1.) Frond pinnate. Main-ftalk winged. Leaflets pinnatifid; their lowermoft lobes fubdivided; fegments obovato-lanceolate, obtufe. A native of the ifle de Bourbon. Swartz unites this with the laft, but it appears to us diftinct. It is indeed but half fo large, which might account for its *frond* being lefs compound; but it differs effentially in having the principal ftalk winged all the way up, and its ultimate fegments are all fhorter, blunter, and rather obovate than lanceolate. Each *line* of capfules is alfo much fhorter, its length being fcarcely twice its breadth. 6. D. *pectinata*. Frond pinnate. Main-ftalk winged upwards. Leaflets crowded, nearly oppofite, pinnatifid; fegments lanceolate, obtufe, the lowermoft palmate. For this beautiful fpecies we are obliged to Mr. Menzies, who found it in the Sandwich iflands. It is of a richer green than the foregoing. *Frond* linear-lanceolate, a foot high, with a fhort ftalk. *Leaflets* numerous, crowded, nearly if not quite oppofite, fcarcely above an inch long, linear-lanceolate, bluntifh, cut into feveral lanceolate bluntifh fegments; all fimple, except here and there one which is flightly cloven, and the firft at the bafe of each leaflet at its upper edge, which is palmate. *Lines* rather longer, and much narrower, than in the laft. 7. D. *vivipara*. (Cœnopteris vivipara; Berg. in Act. Nov. Petrop. v. 6. 250. t. 7. f. 3. Sw. Fil. 89. Acroftichum viviparum; Linn. Suppl. 444.) Frond doubly

bly pinnate. Leaflets linear-lanceolate, acute, fimple, cloven, palmate or pinnatifid. Gathered by Sonnerat in the isles of Mauritius and Bourbon, and communicated by Thouin to the younger Linnæus, who candidly obferves that "it but ill agrees with the generic character of *Acroftichum*, but that its fructification comes forth as in A. *feptentrionale* and *auftrale*." This is correct, if the direction in which the cover feparates be overlooked, and this no one had then thought of. The *frond* has a broadifh-lanceolate, pointed form, and is doubly pinnate. Its primary divifions are oppofite, fomewhat crowded, linear-lanceolate, taper-pointed, fubdivided into numerous alternate *leaflets*, of which the uppermoft are linear-lanceolate, acute, undivided; the next cloven; thofe ftill nearer the bafe palmate or pinnatifid, all the fegments being uniform. *Lines* folitary in each leaflet or fegment, very long and narrow. Sometimes the feeds germinate upon the plant, and the inverfely-heart-fhaped feed-lobes are very apparent. 8. D. *cicutaria.* (D. tripinnata; Cav. Leccion. 259? Cœnopteris cicutaria; Sw. Fil. 88. Afplenium cicutarium; Sw. Prod. 130. A. criftatum; La Marck Encycl. v. 2. 310. Filix pinnulis criftatis; Plum. Fil. 34. t. 48 A. Petiv. Fil. t. 5. f. 8. Rutæ murariæ accedens filicula, &c.; Sloane Jam. v. 1. 92. t. 52. f. 3.) Frond doubly pinnate. Leaflets crowded, pinnatifid and palmate, fomewhat wedge-fhaped; fegments elliptical, obtufe. Not rare in Jamaica, or other Weft Indian iflands. *Frond* from one to two feet high, dark green, doubly pinnate in an alternate order. *Leaflets* fomewhat ovate or obovate, very much crowded, pinnatifid or palmate, efpecially the firft fegment of each leaflet, which is broad and wedge-fhaped; the reft are elliptical inclining to lanceolate, and obtufe. *Lines* fhortifh, brown. 9. D. *microphylla.* Frond doubly pinnate. Leaflets doubly pinnatifid; fegments uniform, linear. Cover jagged. Brought by Mr. Menzies from the Sandwich iflands. The *frond* is three feet or more in height, far more compound than in any other known fpecies; infomuch that each confifts, at a very moderate computation, of at leaft a million of fegments; and as ten capfules, if not more, may be reckoned to each fegment, one with another, the quantity of feeds produced by each plant will be found fo immenfe, that if they and their offspring were to increafe for a few years at the fame rate, the land of the whole globe would be covered with this fern, as, according to Linnæus's computation, the offspring of one haddock would in twenty years fill up the whole ocean. The principal divifions of the *frond* very much refemble the leaves of *Achillea millefolium*. They are alternate, and alternately pinnate, each *pinna* being in like manner doubly and deeply pinnatifid, of a dark green; the ultimate fegments uniform, about a line in length, linear, or fomewhat lanceolate, bluntifh, often with a minute curved point. *Dots* dark brown, chiefly on the lowermoft fegments. *Covers* broadifh, tranfparent, brown, jagged or crifped. 10. D. *rhizophylla.* (Cœnopterus rhizophylla; Sm. Pl. Ic. ex Herb. Linn. t. 50. Sw. Fil. 88.) Frond doubly pinnate, taking root at the point. Leaflets ftalked, obovate, fomewhat falcate; the lowermoft lobed. Gathered in Hifpaniola, by M. Thierry de Menonville. *Frond* a fpan long, darkifh-green, lanceolate, taking root by the naked point of its ftalk, alternately doubly pinnate, fmooth. *Leaflets* on fhortifh ftalks, rather diftant, broad, obovate, obtufe, fomewhat falcate or curved, now and then obfcurely notched, the lowermoft efpecially lobed. *Dots* broad and fhort, folitary towards the bafe of each leaflet at its upper edge. Dr. Swartz now refers Sloane's t. 52. f. 3. to this fpecies, which we are confident he had originally cited with much more propriety under D. *cicutaria*, which it reprefents in a young and barren ftate. 11. D. *myriophylla.* (Cœnopteris myriophylla; Sw. Fil. 88.) Frond twice or thrice pinnate. Stalks winged. Leaflets obovate, obcordate, or lobed. Gathered in Jamaica by Dr. Swartz, one of whofe fpecimens has been given us by Mr. Menzies. It is fmaller than the laft, and of a pale green, appearing curioufly fpeckled under the microfcope. *Stalks*, both general and partial, all equally winged, and twice or thrice compounded in an alternate manner. *Leaflets* a line or rather more in length, ftalked, obovate, obtufe, entire, keeled, fometimes cloven fo as to be inverfely heart-fhaped, more rarely three-lobed. *Lines* pale brown. The name of this fpecies would have been much more applicable to our D. *microphylla*, had it not been pre-engaged. 12. D. *heterophylla.* Frond deeply pinnate. Barren leaflets rhomboid, cut and ferrated; fertile ones fuperior, deeply pinnatifid; their fegments linear; fometimes forked. A native of New South Wales, near Port Jackfon, from whence we received it through the hands of the late R. Molefworth, efq. It is one of the fineft and moft remarkable of its genus. *Frond* about two or three feet high, of a palifh, fomewhat glaucous green, fmooth, broad, doubly and alternately pinnate. The lower *leaflets*, till towards the middle of the frond, are barren, above an inch long, of a broad lanceolate figure, inclining to rhomboid; dilated, lobed, and approaching to auricled, at their bafe; their margin jagged and ferrated: all the upper leaflets of the fame dimenfions, but very deeply pinnatifid, their fegments alternate, linear, acute, entire, fome of the lower ones occafionally cloven or forked. The upper edge of each fegment is almoft entirely occupied by a long *line* of fructification, whofe reflexed, fmooth, whitifh *cover* is very confpicuous. *Capfules* very numerous, brown. S.

DAREC, in *Geography*, a town of Perfia, in the province of Segeftan; 60 miles S. of Zareng.

Darec *de Camuna*, a town of Perfia, in the province of Mecran; 180 miles W. of Kidge.

DAR-El-Hamara, a town of Africa, in the kingdom of Fez, faid to have been built by the Romans; the trade of which confifts principally in corn and oil. N. lat. 34° 20'. W. long. 8° 46'.

DAREMMA, in *Ancient Geography*, a town of Afia, placed by Ptolemy in the interior of Mefopotamia.

DAREN, in *Geography*, a river of Wales, in the county of Caernarvon, which runs into the fea; 15 miles S.W. of Pwllhely.

DARENT, a river of England, in the county of Kent, which runs into the Thames, 3 miles N. of Dartford. The mouth near the Thames is called *Dartford Creek.*

DAREW, a town of Lithuania, in the palatinate of Novogrodek; 34 miles S.S.E. of Novogrodek.

DAR-FUR, a country in the interior part of Africa, extending, according to Mr. Browne's map, from about 11° to 15° 20'. N. lat. and in its greateft breadth from about 26° to 29° 15'. E. long. The capital of this country is *Cobbé*; which fee. The other towns of principal note are Sweini, Kûrma, Cubcabia, Ril, Cours, Shoba, Gidid, and Gellé. Sweini is fituated almoft north of Cobbé, at the diftance of more than two days' diligent travelling. Kûrma, or Kourma, is a fmall town, W. by S., at the diftance of 4½ or 5 hours, 12 or 13 miles. Cubcabia, a more confiderable place, is nearly due weft, at the diftance of 2½ days. Cours, a place of little note, N.W. by W. at 5½ hours travelling from Cobbé. Ril is fomewhat more than three days removed from it, in the direction S.S.E., or about 60 miles. Shoba is 2½ days from Cobbé. Gidid is nearly S.E., and about 1½ day from Cobbé. Gellé is not far from Cubcabia, but fome hours further removed to the fouth. (See the refpective

tive articles.) The perennial rains, which fall in Dar-Fûr, from the middle of June till the middle of September, in greater or lefs quantity, but generally both frequent and violent, fuddenly inveft the face of the country, which was before dry and fterile, with a delightful verdure. As foon as the rain begins, the proprietor, and all the affiftants he can collect, go out to the field, and having made holes at about two feet diftance from each other, with a kind of hoe, the *dohn* is thrown into them, and covered with the foot. The time for fowing the wheat is nearly the fame. The *dohn* remains nearly two months before it is ripe; the wheat about three. Wheat is fcarce, and as the prefent fultan forbids the fale of it till he is fupplied, it is with difficulty procured by purchafe. The *mahrick*, or greater *kaffob*, which is a larger grain than the *dohn*, is common, and a fmall quantity of fefamum is fown. Their beans are different from ours; and in their gardens are *bamea*, *meluchia*, lentils (*adis*), kidney beans (*lubi*), and fome others. The water-melons, and that called at Cairo *abd-el-awi*, together with fome other kinds, abound during the wet feafon, and even before, if they be watered. Wood is found abundantly in this country; and there are feveral fpecies of trees, but none that produce fruit worth gathering, unlefs it be the tamarind. The dates are few, and their fruit fmall, dry, and deftitute of flavour. Indeed this tree feems not indigenous in the country, but to have been tranfported thither from the neighbourhood of the Nile, Dongola, Sennaar, &c. The quadrupeds, or at leaft the diftinct fpecies of them, are not very numerous. The only good horfes which the inhabitants of this country poffefs, are bred in the country of Dongola, and by the Arabs E. of the Nile. The Arabs feed them with milk, and they are feldom caftrated. None of the horfes of Soudân are fhod. Two or three diftinct fpecies of fheep (*ovis aries*) exift in Soudân. Their meat is not fo good as that of the Egyptian fheep. They are covered with coarfe wool, refembling hair, and apparently unfit for any manufacture. The goats (*capræ cervicipora*) are more numerous than the fheep, and their flefh is cheaper; they are not very different from thofe of Egypt, but fomewhat larger. The afs refembles that of Great Britain, in its form, and indocile nature. The only good ones are brought by the Jelabs from Egypt; but they are not much ufed for riding. The bull is fometimes caftrated; but of the animals flaughtered in the market, the emafculated are feweft in number; nor is any preference manifefted to the one above the other as an article of food. The horned cattle, fed by the tribes in the vicinity of the rivers, amount to a great number, and the tribute paid on their account to the monarch forms a valuable part of his revenue. The beef is good. Cows are alfo abundant; but their milk is not very palatable; fome of the fettlers make of it a kind of cheefe; but the inhabitants are not generally acquainted with that procefs. The camels of Fûr are of a mixed breed, and are found of all colours and fizes. Thofe that are brought directly from the weft or fouth are large, fmooth-haired, and in colour moft frequently approaching to white, or light brown. Many of thofe of Kordofân are black; and they are lefs docile than the others. There are few countries where this animal abounds more than in Dar-Fûr. When the male camel is unruly, they fometimes deprive him by a cruel operation, of one or both of his tefticles. The flefh of the camel, particularly the female, which is fattened for the purpofe, is much ufed for food, and the milk is alfo much efteemed. The camels of Fezzan, and other weftern countries, are reckoned for labour fuperior to thofe of Fûr, and fetch a higher price. The former are larger, and able to carry a greater burden, but lefs capable of enduring thirft. Soudân affords many fine dromedaries; but thofe of Sennaar are moft celebrated. It is faid, that, in travelling, they will proceed at the rate of 10 miles an hour, for 24 hours.

The dogs of Dar-Fûr are of the fame kind with thofe of Egypt; the common houfe-cat is fcarce; and it is faid there are none befides thofe which were brought originally from Egypt. They are of the fame kind with ours. The wild or ferocious animals are, principally, the lion, the leopard, the hyæna, the wolf, the jackal, and the wild buffalo; but they are not commonly feen in the cultivated parts of the empire, except the hyæna and the jackal, which come in herds of fix, eight, and often more, into the villages at night, and are very rapacious. They will kill dogs and affes, even within the houfes; nor are they greatly alarmed at the fight of a man or the found of fire-arms. The people of the country dig pits for them, and lying in ambufcade, when one is entrapped, ftun him with clubs, or pierce him with their fpears. The jackal is harmlefs, but his hideous cry founds to a great diftance. To the animals already enumerated we may add the elephant, the rhinoceros, the camelopardalis, the hippopotamus, and the crocodile. Elephants are feen in large herds of four or five hundred, and it is faid that even 2000 of them are fometimes feen together. They are hunted on horfeback; the hide is applied to many ufeful purpofes, and the flefh is much efteemed for food. The buffalo is not found tame in Soudân: the wild one is hunted by the Arabs, and ufed as food. The hippopotamus is killed for his fkin, which, being very tough, makes excellent fhields and whips; and alfo for his teeth, which are fuperior to ivory. The horn of the rhinoceros is a valuable article of trade, and is carried to Egypt, where it is fold at a high price, and ufed for fabre hilts and various other purpofes. The antelope and the oftrich are very common. The civet cat is common here; and leopards, though common in a certain diftrict, are not found near the feat of government. The Arabs hunt them, ftrip off the fkin, which they fell, and often eat the flefh; imagining that it generates courage and a warlike difpofition. The other quadrupeds are the jerboa or mus jaculus, the abelang or fimia Æthiops, the porcupine or hiftrix ciftria, and the kandar, or fimia cynamolgos. The birds are the oriental dotterel, Guinea fowl, Egyptian quail, white-headed vulture, green peroquet, common pigeon, red partridge, owls, though not common, and columba turtur, very common. The white-headed vulture is exceedingly ftrong, and very long-lived. The fifh in the river Ada confift of nearly the fame fpecies with thofe of the Nile in Upper Egypt: they are caught in wicker-bafkets, and ufed for food. The chameleon abounds in Dar-Fûr, and alfo the viverra ichneumon, and almoft all the fpecies of lizard are feen here. Of ferpents, the coluber hayé of Egypt, the coluber vipera, and the anguis colubrina, were the only fpecies feen by Mr. Browne. The Fûrians have not the art of charming them, like the Egyptians and Indians. The white ant, or termites, is very numerous, and exceedingly deftructive; a bull's hide is no fufficient defence againft it. The common bee alfo abounds, but they have no hives; and the wild honey is commonly of a dark colour and unpleafant tafte. The locuft of Arabia, gryllus, is very common, and is frequently roafted and eaten, particularly by the flaves.

Of metals, the number found in the diftrict vifited by Mr. Browne is fmall; but to the fouth and weft, thofe of almoft all defcriptions are to be met with. Copper of the fineft quality, and iron, are very common either in Fûr or its vicinity. Silver, lead, and tin, are brought hither from Egypt. Of gold, in the countries to the eaft and weft, the fupply is abundant. Alabafter and various kinds of marble exift

exift within the limits of Fûr. The rocks chiefly confift of granite. Of ftone adapted to building, or convertible into lime, there is either none, or the quantity muft be extremely fmall. Foffi'e falt is common within a certain diftrict; and there is a fufficient fupply of nitre, but it is applied to no ufe. A quantity of fulphur is brought by the Arabs from the fouth and weft. The characteriftic marks of thofe trees which moft abound in Dar-Fûr are their fharp thorns, and the folid unperifhable quality of their fubftance. Of the vegetables, which are very various, we can only felect the following, *viz.* the folanum fanctum, or night-fhade, ufed for food, two kinds of beans, which are ftrung and ufed as ornaments by the women, the common onion, garlick, water-melon, cucumber, the gourd ufed for food when frefh, and ferving for drinking veffels and other purpofes, the colocynthis, very common, the ufhar, a plant fo common as to cover whole plains, and ufed under mats and goods to guard them from the depredations of the white ant; hemp much cultivated, rice, cayenne-pepper, fefamum ufed for food, and by the great for fattening their horfes, Maiseik and dohn, the holcus dochna of Forfkal, which are the bafis of their provifion, particularly the latter, and tobacco, which feems to be of native growth.

The government is a kind of defpotic monarchy, fimilar to that of other countries, in which the Mahometan religion is profeffed; the fovereign of Dar-Fûr fpeaks in public of the foil and its productions as his perfonal property, and of the people as little elfe than his flaves. The only perfons to whom he pays any great attention are his foldiers. His power in the provinces is delegated to officers, who poffefs an authority equally arbitrary. On the death of the monarch, the title defcends of right to the eldeft of his fons; though the fucceffion is often diverted under various pretences.

The rainy feafon in Dar-Fûr is called "Harif;" and this is of great importance to the country. The changes of the wind are not periodical, but inftantaneous. With a foutherly wind the greateft heat prevails, and with a fouth-eaft wind the greateft quantity of rain falls. The breeze from the north and north-weft is moft refrefhing; and the hot and oppreffive winds, which fill the air with thick duft, blow conftantly from the fouth. The harveft is conducted in a very fimple manner. The women and flaves of the proprietor are employed to break off the ears with their hands, leaving the ftraw ftanding, which is afterwards applied to buildings and various other ufeful purpofes. They are then carried away in bafkets. When thrafhed, which is awkwardly and incompletely performed, they expofe the grain to the fun till it becomes quite dry; and then dig a hole in the earth, the bottom and fides of which are covered with chaff to exclude the vermin. This cavity is filled with grain, which is covered firft with chaff and then with earth. When it is wanted for food, they grind it, and boil it in the form of polenta; and eat it either with frefh or four milk, or, more frequently, with a fauce made of dried meat pounded in a mortar, and boiled with onions, &c. The Fûrians ufe little butter. As a fubftitute for bread, cakes of the fame material are baked on a fmooth fubftance prepared for the purpofe, which are very thin and not unpalatable. Thefe are eaten with the above-mentioned fauce, or with milk, or merely with water; but in whatever form the grain be ufed, the rich caufe it to be fermented before it be reduced to flour, which gives it a very agreeable tafte. They alfo eat the dohn raw, moiftened with water, without either grinding it or fubjecting it to the operation of fire.

In the beginning of the wet feafon, or "Harif," the king goes out with his meleks and the reft of his train, not only to obferve the fowing of the feed, but to take part in the operation, by making feveral holes with his own hand. Whether this ufage be antecedent to the introduction of Mahometanifm into the country, is not known; but as it is attended with no fuperftitious obfervance, it would rather feem to belong to that creed. In order to make fome eftimate of the population of the country, Mr. Browne directed his attention to the war-levies. Hence he concludes, that the number of perfons within the empire cannot much exceed 200,000. In the whole country there are only eight or ten towns of great population. Among the people of Dar-Fûr the Arabs are very numerous; they lead a wandering kind of life in the frontiers, and breed camels, oxen, and horfes; and they are not in fuch a ftate of abfolute dependence as to contribute effectually to the ftrength of the monarch in war, or to his fupplies in peace. After the Arabs we may mention the Zeghawa, which once formed a diftinct kingdom, whofe chief went to the field wiah a thoufand horfemen from among his own fubjects. The Zeghawa fpeak a different dialect from the people of Fûr. We muft then enumerate the people of Bêgo or Dageou, who are now fubject to the crown of Fûr, but are a diftinct tribe, which formerly ruled the country. Kordofân, which is now fubject to Fûr, and a number of other fmaller kingdoms, as Dar-Berti, &c. &c. Dar-Rugna, which has a king, who is, however, dependent, but more on Bergoo than on Fûr. What are the numbers of each it is not eafy to afcertain.

The buildings of the Fûrians are very plain and fimple. A flight roof fhelters them from the fun and rain; the walls are built of clay, and the people of higher rank cover them with a kind of plafter, and colour them red, white, or black. The apartments are of three kinds; one is called a "donga," which is a cube commonly formed in the proportion of 20 feet by 12. The four walls are covered with a flat roof, confifting of light beams laid horizontally from fide to fide; over this is fpread a ftratum of ufhar, or fome other light wood, or coarfe mats; a quantity of dried horfe's or camel's dung is laid over this, and the whole is finifhed with a ftrong and fmooth coating of clay. The roof has a flight obliquity, having fpouts to carry off the water. The "donga" is provided with a door, confifting of a fingle plank, hewn with the axe, as the plane and faw are unknown. It is fecured by a padlock, and thus conftitutes the repofitory of all their property. The next apartment is called a "kournak," which is fomewhat larger than the donga, having no door, and having no other roof but thatch, like our barns, compofed of kaffob, the ftraw of the maize, and fupported by light rafters. This is cooler in fummer than the more clofely covered buildings, and is appropriated to receiving company, and fleeping. The women are commonly lodged, and drefs their food in another apartment of the fame kind as the laft, but round, and from 15 to 20 feet in diameter, and this is called "fukteia." A houfe in which there are two "dongas," two "kournaks," and two "fukteias," is confidered as a large and commodious one, adapted to the ufe of merchants of the firft order. A "rukkuba" (fhed) is frequently added; and this is merely a place fheltered from the fun, where a company fit and converfe in the open air. The interior fence of the houfe is commonly a wall of clay; the exterior univerfally a thick hedge, confifting of dried branches of accacia and other thorny trees, which fecures the cattle, and prevents the flaves from efcaping.

The troops of Dar-Fûr are not famous for military fkill, courage, or perfeverance. In their campaigns, therefore, they

they chiefly rely on the Arabs, who accompany them, and are more properly tributaries to the fultan than his fubjects. In their perfons the Fûrians are not remarkable for cleanlinefs, though obferving as Mahometans all the fuperftitious formalities of their religion; their hair is rarely combed, or their bodies completely wafhed. The hair of the pubes and axillæ they ufually exterminate; but they know not the ufe of foap, fo that with them the polifhing of the fkin with unguents fupplies the want of perfect ablutions, and real purity. An inveterate animofity fubfifts between the natives of Fûr, and thofe of Kordofân, which feems to be owing to their relative pofitions, Kordofân lying in the way between Dar-Fûr and Sennaar; and this is the moft practicable communication between the former and Mecca. Nothing refembling current coin is known in Soudân, unlefs it be fmall tin rings, the value of which is arbitrary; gold, not being found within the limits of Fûr, is feldom feen in the market. The articles chiefly current are all fuch as belong to their drefs, fuch as cotton cloths, beads, amber, kohhel, rhéa, ; and on the other hand oxen, camels, and flaves.

The difpofition of the people of Fûr appears to be more cheerful than that of the Egyptians. Prone to intoxication, but unprovided with materials or ingenuity to prepare any other fermented liquor befides "buza," with this alone their exceffes are committed; and this liquor they freely ufe, though it is prohibited by an ordinance of the fultan, under pain of death. This buza has a diuretic and diaphoretic tendency, which precludes danger from their excefs in the ufe of it. In this country dancing is a favourite and common amufement, both among the men and women; and even the flaves dance in fetters to the mufic of a little drum. The vices of thieving, lying, and cheating in bargains, are very prevalent; and fo much are they addicted to fraud, that in buying and felling the parent glories in deceiving the fon, and the fon the parent. Of the privilege of polygamy, allowed by their religion, they freely avail themfelves, fo that the Fûrians take both free women and flaves without limitation. The fultan has more than 100 free women, and many of the meleks have from 20 to 30. The females here are not under fuch reftraints as they are in many other countries. None attempt to conceal their faces but the wives of the great, who do it from an affectation of delicacy, more than from real modefty; thofe of the middle and inferior rank are always contented with the flight covering of a cotton cloth wrapped round their waift, and, occafionally, another of the fame form, materials, and fize, artlefsly thrown over the fhoulders. They never eat with the men. Some of the moft labourious domeftic offices in this country are performed by the women; they not only prepare the foil and fow the corn, but affift in gathering it. They alfo grind it, and convert it into bread. Their clay buildings are chiefly conftructed by the women. Their labour, however, is accompanied with a confiderable degree of authority and influence in domeftic concerns.

Previoufly to the eftablifhment of Iflamifm, about a century and a half ago, and kingfhip, the people of Fûr feem to have formed wandering tribes, in which ftate many of the neighbouring nations remain to this day. In their perfons they differ from the negroes of the coaft of Guinea; their hair is generally fhort and woolly; and their complexion is for the moft part perfectly black. But the Arabs, who live among them, and intermarry with them, retain their diftinction of feature, colour, and language. In moft of the towns, except Cobbé, which is the chief refidence of foreign merchants, and even at court, the vernacular idiom is in more frequent ufe than the Arabic, and their judicial proceedings are conducted in both languages. Next to the officers of government, the "faqui," or learned man, *i. e.* the prieft, holds the higheft rank. Their learning, however, folely confifts in the knowledge of the Koran. The revenues of Dar-Fûr arife from feveral fources. On all merchandize imported the king has a duty amounting in fome inftances to near a tenth. When the merchants of Egypt leave Dar-Fûr on their return to their own country, another tax is demanded on the flaves exported. All forfeitures for mifdemeanours are due to the king, and thefe amount to a confiderable value. Every judicial proceeding is brought before the king, attended with a prefent proportioned to the rank and property of the perfons concerned. The king is entitled to a tenth of all the merchandize, and efpecially flaves, brought from all quarters, and in cafe of an expedition to procure flaves by force, this tenth becomes a fifth. At a particular time of the year, when a ceremony called "leathering the kettle-drum," takes place, all the principal people muft attend with prefents, which furnifh a very confiderable addition to the royal revenue. Prefents are cuftomary on many other occafions. But one of the principal fources of revenue is the tribute of the Arabs, who breed oxen, horfes, camels, and fheep. Moreover, every village is obliged to pay annually a certain fum in corn, dohn, which is collected by the king's flaves. The king is alfo the chief merchant in the country; and he difpatches, with every caravan to Egypt, a great quantity of his own merchandize, and employs his flaves and dependants to trade for him.

The people of Fûr are reprefented as ufing many fuperftitious ceremonies at the "leathering of the kettle-drum;" among others, it is faid, they put to death in the form of a facrifice a young boy and girl. Even to this day many idols are worfhipped by the women of the fultan's haram; and the mountaineers offer a kind of facrifice to the deity of the mountains, when they are in want of rain. For further particulars we muft refer to Mr. Browne's ample and interefting account of Dar-Fûr, and the adjacent countries, in his "Travels in Africa, &c. from the year 1792 to 1798."

DARGAN, a town of Afia, in the country of Charafm, fituated on the Gihon.

DARGASIN, a town of Perfia, in the province of Irac-Agemi; 48 miles N.E. of Amadan.

DARGASP, a town of Perfia, in the province of Segiftan, feated on the river Hinmand.

DARGEL, a river of the county of Wicklow, in Ireland, which falls into the Irifh fea at Bray. In its courfe it paffes through fome very romantic glens, one of which, in the demefne of lord vifcount Powerfcourt, is peculiarly ftriking, and is much frequented. In the neighbourhood is a very fine fall of water, which is generally vifited at the fame time. An excurfion to the Dargel and water-fall never fails to delight the lovers of picturefque fcenery, and defcriptions of them may be found in moft of the travels through Ireland.

DARGIDUS, in *Ancient Geography*, a river of Afia, in Bactriana; which had its fource in mount Paropamifus, and after a northern courfe difcharged itfelf into the Oxus.

DARGIES, in *Geography*, a fmall town of France, in the department of the Somme; 6 miles S. of Poix.

DARGOMANES, in *Ancient Geography*, a river of Afia, in Bactriana, which ran into the Oxus; fome have fuppofed that it is the Morga or Marou of modern times.

DARGUN, or Dragun, in *Geography*, a fmall town of Germany, in the duchy of Mecklenberg Schwerin, in the diftrict of Roftock, with an ancient ducal palace, which was originally a convent of Benedictine monks, founded in 1149.

DARIC, in *Antiquity*, a famous piece of gold, firft coined, as fome have faid, by Darius the Mede, about 538 years B. C.;

B. C.; probably during his ſtay at Babylon, out of the vaſt quantity of gold which had been accumulated in the treaſury: but as others ſay, by Darius ſon of Hyſtaſpes, who began his reign 521 years B. C. It is much queſtioned, however, whether the Athenians ever ſtruck any gold coin, while they were a free and flouriſhing people. The hiſtoriographers, indeed, tell us, the χρυσοῦς Ἀττικὸς was equal to the daric, and ſpeak of gold mines at Laurium; but no ancient writer mentions ſuch a coin, and all agree that the mines at Laurium were ſilver. That they had no gold, even at the beginning of the Peloponneſian war, appears from the account given by Thucydides, (lib. xi. c. 13.) of the drachma, then in the Acropolis, which conſiſted of ſilver in coin, and gold and ſilver bullion: but he would certainly have mentioned gold in coin, if there had been any. From Babylon the Perſian daric was diſperſed over the Eaſt, and alſo into Greece; ſo that this coin, which was alſo called ſtater, was the gold coin beſt known in Athens in ancient times. The ſize and weight of theſe darics have not been accurately aſcertained. Joſephus, cited by Arbuthnot, ſays they were equal to the didrachm in weight, and worth 50 Greek drachmæ. But many authors, particularly Xenophon, inform us, they were didrachms, and worth 20 ſilver drachmas. According to Dr. Bernard, the daric weighed two grains more than one of our guineas; but as it was very fine, and contained little alloy, it may be reckoned worth about twenty-five ſhillings of our money. Plutarch informs us, that the darics were ſtamped on one ſide with an archer clothed in a long robe, and crowned with a ſpiked crown, holding a bow in his left hand, and an arrow in his right; and on the other ſide with the effigies of Darius. All the other pieces of gold of the ſame weight and value, that were coined by the ſucceeding kings both of the Perſian and Macedonian race, were called darics, from Darius, in whoſe reign this coin commenced. Of theſe there were whole darics and half darics: and they are called in thoſe parts of Scripture written after the Babyloniſh captivity, adarkonim; and by the Talmudiſts, darkonoth. Greaves ſays that the daric is ſtill found in Perſia; but it is certainly very ſcarce, and perhaps of doubtful antiquity. Theſe were moſtly melted down by Alexander the Great upon his conqueſt of Perſia. There is one of them in lord Pembroke's cabinet, which weighs 129 grains, and ſhews them to have been didrachms on the Eubœic or Attic ſtandard. Suidas in Δαρεικός. Bernard de Ponder, &c. p. 171. Prideaux's Conn. vol. i. p. 182, &c. Phil. Tranſ. vol. lxi. part 2. art. 48. Pinkerton's Eſſ. on Medals, vol. i. ſect. 17.

DARIAUSA, in *Ancient Geography*, a town of Aſia, in the interior of Media.

DARIDNA, a town of Paphlagonia. Steph. Byz.

DARIEN, in *Geography*, a poſt-town of America, in M'Intoſh county and ſtate of Georgia, near the heights of which the north channel of Alatamaha river flows, about 20 miles above Sapalo iſland, and 10 below fort Barrington: 47 miles S.S.W. of Savannah. N. lat. 31° 23′. W. long. 80° 14′.

DARIEN, *Gulf of*, the mouth of a large river, or an arm of the ſea, in a province of South America, of the ſame name, running up into the land for a conſiderable diſtance, and opening into the Caribbæan ſea, or Spaniſh main; about N. lat. 8°, and W. long. 76° 30′. In this gulph are three iſlands of conſiderable ſize, *viz.* Golden iſland; another, the largeſt of the three, and the iſland of Pines, beſides ſome ſmaller ones.

DARIEN, *Iſthmus of*, a province of the vice-royalty of New Granada, in South America; and the northern part of Terra Firma; extending on both ſides of the gulf of the ſame name; and from the proximity of the city of Panama and a conſiderable coaſt on that bay, reaching as far as the diſtrict of Zinu, with a length of ſhore on the Caribbæan ſea. It is bounded on the north by the Caribbæan ſea, or Spaniſh main, on the eaſt by the province of Carthagena, on the ſouth by the bay of Panama, Choco, and the country of Popayan, and on the weſt by Veragua and part of the Pacific ocean. It is ſometimes called Terra Firma Proper, to denote that, however narrow this iſthmus, in the part of it which adjoins to or includes Panama, ſometimes called the Iſthmus of Panama, it was firm land, or belonged to the continent: or rather, becauſe the name was applied indifferently to this and the adjacent province of Veragua in North America, aſſigned as a dukedom to Colon or Columbus, and diſcovered by that great navigator to be certainly continental, when he explored the harbour of Portobello, on his fourth voyage in 1502. This province, which is the largeſt of thoſe in Terra Firma, is about 260 miles in length, and about 80 miles in medial breadth, forming a kind of bow or creſcent about the great bay of Panama, in the Pacific ocean, or South ſea. Its breadth is only about 37 miles from Portobello to Panama, the two chief towns of the province. This neck of land, which, as it were, binds together the continents of North and South America, is ſtrengthened by a chain of lofty mountains ſtretching through its whole length, and rendering it a ſolid barrier ſufficient to reſiſt the impulſe of the oppoſite oceans. The rocky mountains here evince the impracticability of a canal; but by aſcending to a higher latitude northwards, and joining the head of Nicaragua lake to a ſmall river, which runs into the Pacific ocean, a communication might be formed between the two ſeas; and by digging 30 miles through a level low country, a tedious navigation of 10,000 miles round cape Horn might be avoided. Such a junction might in a ſeries of years wear away the ſolid parts of the iſthmus, and form a broad ſtrait between the oceans; in which caſe the gulf ſtream, being turned into a different channel, might ceaſe, and a voyage round the world be much expedited. Neither of theſe oceans fall in at once upon the ſhores, but are intercepted by a great many valuable iſlands, that lie ſcattered along the coaſt, both in the bay of Panama, and in the gulf of Darien. The mountains of Darien are covered with almoſt inacceſſible foreſts. From the tops of ſome of theſe the Spaniards firſt diſcovered the South, or Great Pacific ocean, in the year 1513, and called it the South ſea, becauſe they croſſed the iſthmus from the North ſea; though in reality the Pacific ocean lies weſt of the main land of America. Valleys in that moiſt climate, where it rains two-thirds of the year, are marſhy, and ſo frequently overflowed, that the inhabitants find it neceſſary, in many places, to build their houſes upon trees, in order to elevate them at ſome diſtance from the damp ſoil, and the odious reptiles generated in the putrid waters. Large rivers run down with an impetuous current from the high grounds. In a region thinly inhabited by wandering ſavages, ſingularly wild and ferocious, the hand of induſtry has done little or nothing to mitigate or correct theſe natural diſadvantages. Although ſome of the rivers which water this country are moderately large, yet few of them are navigable, on account of the bars and ſhoals at their mouths. On the N. coaſt the rivers are generally very ſmall, for as they moſtly riſe from the main ridge, which lies near the ſhore, their courſe is very ſhort. The river of Darien, indeed, is very large; but its depth at the entrance does not correſpond to the extent of its mouth, though farther in it is of ſufficient depth. But from thence to Chagre, through the whole length of this coaſt, the rivers are little better than brooks.

brooks. Some of the rivers of this province bring down gold duft, and on the coaft are valuable pearl fiſheries.

This province might be of great importance to the Spaniards; and, indeed, its fituation on both in the North and South feas, the gold fands of its rivers, the treafures of Peru, brought hither and imported into Old Spain, have induced feveral adventurers to make attempts for framing advantageous fettlements at Panama, Portobello, &c. But the country is extremely hot, and the low lands are inundated with continual rains; fo that the country is fingularly unhealthy. Portobello, though in many refpects an advantageous fituation, is nearly ruined: nor have the Spaniards, though fufficiently difpofed to avail themfelves of advantages that prefented themfelves, been able to form any permanent eftablifhments either on the gulf of Darien on the Caribbæan Sea, or that of San Miguel in the Pacific. On the contrary, all the ftations have been withdrawn, except a little fort, which protects the gold mine of Cana, on the frontiers of Choco; and the little garrifon, which comes from Panama, is changed every month. The only products were fome cotton and tobacco. In 1786 the viceroy of New Granada fent an expedition againft the favages of Darien, but the Spanifh troops could not bear the climate. The Indians are fuppofed to amount to 30,000 perfons, without chiefs, and acknowledging no authority, fo that it is impoffible even to form a lafting treaty.

About 10 years after Columbus had difcovered the main land of America, the Spaniards ferioufly attempted to eftablifh a fettlement in the country. In purfuance of thefe attempts, a feeble colony fettled in the year 1510, at Santa Maria de Antigoa, on the gulf of Darien, under the command of Vafco Vagnez de Balboa, who gained the confidence of his countrymen by his diftinguifhed courage and conduct. See Balboa.

For an account of the expedition of the Scots to this province, fee *Scotch Darien* Company and Caledonia.

DARII, in *Logic*, a mode of fyllogifms in the firft figure, wherein the major propofition is an univerfal affirmative, and the minor and conclufion particular affirmatives. *E. gr.*

DA "They who fpeak well of every body have many friends."
RI "Some fpeak well of every one."
I "Therefore fome have many friends."

DARION, in *Ancient Geography*, a town of Phrygia. Steph. Byz.

DARIOVIGUM, afterwards called *Veneti*, a town of Gaul, in the fouthern part of Armorica. Cæfar fays, that this town, which was fituated on a point of land furrounded by the fea, twice a day, was rich and powerful, and that it had the command of the fea, and of the whole commerce of Armorica. He took it with difficulty, deftroyed it, and fold the inhabitants by public fale. It was the capital of the *Veneti*.

DARISTANE, a town of Perfia, the inhabitants of which were called *Daritæ*.

DARITIS Regio, a country of Media.

DARIUS I., in *Biography*, king of Perfia, was the fon of Hyftafpes, a commander under Cyrus the Great; and by Cambyfes he was made governor of the province of Perfia. When Smerdis ufurped the throne, Darius affociated himfelf with fix other perfons, in order that they might deftroy the tyrant. They fucceeded; he was killed by the hand of Darius. Afterwards they agreed that the feven fhould repair to the city, and he whofe horfe firft neighed fhould be proclaimed fole fovereign. Darius, it is thought, ufed fome fpecial means to obtain the crown, and he was accordingly raifed to the empire of Perfia, B. C. 521. On his acceffion he married the two daughters of Cyrus, and other wives: and divided the whole empire into twenty governments, and appointed a certain tribute to be paid by each, that of Perfia only excepted. Darius was guilty of fome cruelties; but he is celebrated in hiftory for the permiffion which he gave to the Jews to refume the rebuilding of their temple, which had been interrupted by the malicious infinuations of the Samaritans.

In the early part of his reign the Babylonians revolted, nor was it in the power of Darius with all his force to take their city, to which he laid fiege; at length Zopyrus, one of his principal officers, in zeal for his fovereign, cut off his ears and nofe, and pretending that it was a punifhment inflicted upon him by the king, went over to the enemy, and obtained their confidence, which he employed to betray the gates of the city to the Perfian army. Darius exercifed extreme cruelty on the conquered, but beftowed on his officer Zopyrus the moft magnificent rewards. Darius next engaged in an expedition againft the Scythians: he marched with a vaft army to the Thracian Bofphorus, which he croffed by a bridge of boats, and after reducing Thrace, advanced to the Danube, which he croffed, and entered Scythia, but he was obliged to return without gaining any material advantages. Darius is faid to have conquered India; but his triumphs did not extend, probably, far into the country. The fucceffes of this fovereign were various; in fome inftances his ambition was completely checked, in others he was glad to withdraw his armies with great lofs. In an expedition againft Greece the enterprife was committed to Mardonius, who marched through Thrace into Macedonia, which fubmitted to his arms; but as he was proceeding fouthward, his fleet was almoft wholly ruined by a ftorm, fo that he was obliged to return inglorioufly into Afia. Darius did not, however, abandon his defign: he fent a powerful army, with orders to fack the cities of Athens and Eretria, and to fend him all the furviving inhabitants in fetters. The Perfians took the ifle of Naxus, and city of Eretria; but they were defeated at Marathon by the Athenians and Plateans, commanded by the celebrated Miltiades. Their fleet was alfo completely unfuccefsful in an attempt to furprife Athens. He now refolved to go into Greece himfelf, and iffued orders to all his fubjects in the feveral provinces of the empire to accompany him in his expedition; but after he had fpent three years in making the requifite preparations, a new war was occafioned by the revolt of Egypt. He then determined to fend part of his forces againft the Egyptians, while he marched with the remainder into Greece. When every thing was ready, and Xerxes his fon declared heir-apparent to the crown, Darius fell fick and died, in the thirty-fixth year of his reign. This happened in the year B. C. 485. This fovereign was endowed with many good qualities: his wifdom, juftice, and clemency are warmly commended by the ancients; and when he is compared with the generality of eaftern defpots, he may be entitled to the praife of juftice and humanity.

Darius II. furnamed Ochus, and alfo Nothus, was one of the natural fons of Artaxerxes Longimanus. He afcended the Perfian throne in the year 423 B. C. His hiftory as a fovereign is but a defcription of fucceffive revolts, terminating in the defeat and death of thofe who excited them. He died in the 20th year of his reign, and was fucceeded by his fon Arfaces, who affumed the name of Artaxerxes, and received the appellation of Mnemon from the Greeks, on account of his extraordinary memory. It is related of Mnemon, that while attending upon his father in his laft hours, he afked how he could beft perform the duties of government, to which Darius replied, that he had himfelf

conftantly acted, to the beft of his knowledge, in obedience to the dictates of juftice and religion.

Darius III. named Codomannus, was placed on the throne by Bagoas the eunuch, who had murdered Arfes, the youngeft fon of Artaxerxes Ochus. Codomannus did not, however, fully anfwer the expectations of Bagoas, and he refolved to deftroy him alfo by poifon; but the plot was difcovered, and the perfidious eunuch was obliged to drink the fatal cup himfelf. The whole of this prince's reign is that of a ftruggle againft the Macedonian invafion, the events of which will be found in another part of our work. See Macedonia and Persia. Darius did not take the command of his army in perfon till Alexander advanced into Cilicia. He then proceeded to meet him in all the pomp of royalty; but with a force ill adapted to contend with fuch an enemy. He refolved neverthelefs to hazard a battle, contrary to the advice and opinion of his Greek allies. The battle at Iffus was fought, and Darius took the command, but fled with fuch precipitation, that he left behind him his bow, fhield, and mantle. His camp was plundered, and his mother, wife, and children fell into the power of the conqueror. In vain after this did Darius fupplicate for an accommodation: Alexander went on in the career of victory, and in a fecond pitched battle, at Gaugamela, Darius again fought, and again difgracefully fled. He now loft Babylon, Sufa, Perfepolis, and all his treafures, and fought for perfonal fafety at Ecbatana; but his misfortunes had alienated the minds of his fubjects, and he was feized by Beffus, governor of Bactria, who affumed the royal authority in his ftead. Alexander clofely purfued the ufurper and his captive beyond the Cafpian Straits. Here Darius determined to remain; but his refolution coft him his life: he was wounded by his own fubjects, and left weltering in his blood. Of Polyftratus, a Macedonian, he befought a little water, which being brought to him, he defired that his acknowledgments and thanks might be conveyed to Alexander for his kindnefs and attention to his family, with an earneft exhortation that he would avenge his death on the traitors. Darius immediately breathed his laft in the arms of Polyftratus. This was in the 330th year B. C. being the 50th of the monarch's age, and the 6th of his reign. When his enemy Alexander beheld his rival dead, he is faid to have wept over him, to have covered the body with his own cloak, and fent it to be embalmed, and interred with the remains of the Perfian monarchs. Univerfal Hiftory.

DARK-Chamber. See Camera-*Obfcura*.

Dark-*Rays*, in *Philofophy*, are certain emanations from the fun, which have been recently difcovered. They are not perceptible to our eyes, but they are manifefted by their effects. Dr. Herfchel, and Mr. Ritter, are the difcoverers of thefe emanations. The former of thofe gentlemen obferved, that when the rays of the fun are refracted by a glafs prifm, and form the coloured fpectrum upon any furface, a thermometer placed beyond the fpectrum is elevated by the heat of certain rays or emanations, which are by no means vifible; fo that in fact, if the expreffion be allowable, there is an invifible fpectrum of *calorific* rays, independent of the vifible fpectrum of coloured rays, formed by the prifmatic refraction of folar light. Dr. Herfchel traced the extent of the former, and endeavoured to afcertain the various intenfities of heat in different parts of it. But a more particular account of thefe invifible calorific rays will be found under the articles, Solar *heat*, and Rays *of heat*.

Mr. Ritter, on the continent, and, foon after, Dr. Wollafton in England, unknown to each other, difcovered that the luminous folar rays are accompanied with certain other invifible rays or emanations, which are only cognizable by their chemical effects upon certain fubftances, fuch as muriate and nitrate of filver. Thefe rays are more refrangible than the violet rays of the coloured fpectrum. Dr. T. Young, fpeaking of thefe invifible rays of Ritter, in a paper which is to be found in the Phil. Tranf. for the year 1803, fays, "I was defirous of examining the effect of their reflection, from a thin plate of air, capable of producing the well known rings of colours. For this purpofe I formed an image of the rings, by means of the folar microfcope, with the apparatus which I have defcribed in the journals of the Royal Inftitution; and I threw this image on paper dipped in a folution of nitrate of filver, placed at the diftance of about nine inches from the microfcope. In the courfe of an hour, portions of three dark rings were very diftinctly vifible, much fmaller than the brighteft rings of the coloured, and coinciding very nearly, in their dimenfions, with the rings of violet light that appeared upon the interpofition of violet glafs. I thought the dark rings were a little fmaller than the violet rings, but the difference was not fufficiently great to be accurately afcertained; it might be as much as $\frac{1}{30}$ or $\frac{1}{40}$ of the diameters, but not greater. It is the lefs furprifing that the difference fhould be fo fmall, as the dimenfions of the coloured rings do not by any means vary at the violet end of the fpectrum, fo rapidly as at the red end."

It appears then, that the folar light confifts of three different emanations, or of three different kinds of rays; *viz.* the vifible coloured rays, the invifible calorific rays, and the invifible rays which are only difcernible by their chemical effects upon certain fubftances. All thefe emanations are intermixed with each other in the direct rays of the fun; but, being differently refrangible, they are feparated from each other by the glafs prifm, and their prefence is manifefted by their peculiar properties.

Dark-*Tent*, a portable camera obfcura, made not unlike a defk, and fitted with optic glaffes, to take profpects of landfcapes, buildings, fortifications, &c. See Camera *Obfcura*.

DARKEHMEN, in *Geography*, a fmall town of Pruffia, in that part of Eaftern Pruffia which is called Lithuanian Samland, in the diftrict of Infterburg, remarkable for its woollen cloth manufactures, and for a colony of Saltzburghers, who fettled in the year 1732.

DARKNESS means the abfence or the want of light. In common language we confider ourfelves as being in darknefs, whenever objects that are pretty near to us, cannot be diftinguifhed from each other; but perfect darknefs does not eafily occur; and it is owing to this that feveral animals can fee in what we call darknefs; *viz* the eyes of thofe animals are fo formed as to be able to fee with very little light. But it appears from the experiments of M. le Cat and others, that no animal can fee in perfect darknefs where no light is emitted, even from any phofphorefcent body; and fuch phofphorefcence may fometimes proceed even from the animal itfelf.

The inquiries concerning the nature of darknefs are fo intimately connected with thofe of light, (for the one is the want of the other,) as not to demand any particular examination in this place. The grand queftion is, whether light is an emanation of matter from the luminous body, or is the propagation of a certain movement through a peculiar fubftance conftantly difperfed throughout the univerfe. Whence it follows, that darknefs either is a total privation of light, or a ftate of quiefcence in that matter which, when put in motion, produces the phenomena of light. The prefent ftate of philofophical knowledge feems to render it more than probable, that light is a real fubftance thrown out in every direction

rection from the luminous bodies; this queſtion, however, will be particularly examined under the article LIGHT.

DARKSVILLE, in *Geography*, a town of America, in Maryland, containing 132 inhabitants.

DARLING ISLAND, is the largeſt of two iſlands at the entrance of lake Simcoe, in Upper Canada.

DARLINGTON, a market and borough-town in the county of Durham, England, is ſituated on the ſide of a hill, which ſlopes to the river Skerne, over which is a bridge of four arches. The name is ſuppoſed to be derived from *Der* or *Dar*, an ancient appellation of the river, *Inge*, the Saxon term for a meadow, and *ton*, a town or village. It is a place of remote antiquity. In the time of the Saxon king Ethelred, a nobleman named Stere, the ſon of Wulf, obtained permiſſion of the king, that Darlington, with its appendages, ſhould be reſtored to St. Cuthbert. To which the king, the archbiſhop of York, and Aldwine, biſhop of Durham, became witneſſes. And in the ſurvey, contained in "the Balden Buke," Darlington is particularly noticed. It is a large populous trading town, and borough by preſcription; conſiſting of ſeveral well built ſtreets, iſſuing from a central ſquare; and makes a clean and reſpectable appearance. Amongſt its buildings, the greateſt ornament is the church, which ſtands at the ſouth-weſt angle of the market place. It is ſaid to have been erected by biſhop Hugh Pudſey, about the year 1160, who alſo built a manſion-houſe near it, and inſtituted a college for a dean, and three ſecular canons. The church is a ſpacious ſtructure in the form of a croſs, with a tower crowned with a ſpire, which riſes to the height of one-hundred and eighty-feet. The tower ſprings from uniform arches in the centre, ſupported by cluſtered columns; but the arches of the nave and aſles are irregular in ſhape and ſize. The weſt door is highly finiſhed with arches, having alternate cylindric and octagonal pilaſters. In this church were four chantries amply endowed. The endowment of one, called Marſhal's-chantry, was, in the time of Elizabeth, granted by the crown for the foundation of a free grammar-ſchool. The charter was granted 15th of June 1567, and a portrait of the royal founder was placed in the ſchool by the late George Allan, eſq. F.S.A.; as a memorial of his gratitude in having received his early education there. The epiſcopal palace, being in a decayed condition, is now leaſed for the purpoſe of a workhouſe. Darlington is conveniently ſituated near a river, and has a market well ſupplied, and proviſions cheap. Here is a very flouriſhing manufactory of worſted ſtuffs, ſuch as morreens, tammies, &c.; another of linens of different deſcriptions, particularly diapers, huckabacks, and checks. The manufacture of cotton has lately been introduced, under the direction of Mr. John Murrell, and promiſes to add to the population and reſources of the place. The abundance of water gives facility to the means of manufacturing, by the opportunity it affords of erecting machinery. Here is a mill for ſpinning wool, another for ſpinning hemp; and here was erected the firſt mill for grinding optical glaſſes in the kingdom. This was an invention of the late ingenious John Kindrew, a native of this place. Here is a ſociety for the improvement of agriculture; and an act was obtained about the year 1767 for cutting a navigable canal from Stocton, by Darlington, to Wurſton; but owing to a powerful oppoſition, it was never put into execution. According to the returns under a late act, Darlington contained 945 houſes, and 4670 inhabitants. Its market for wool, corn, cattle, and other proviſions, is on Mondays; and it has four annual fairs. The town ſends two members to parliament; and the living is a perpetual curacy. At Oxenhall, about three miles from Darlington, are ſome deep cavities, vulgarly called *Hell-Kettles*. Of their origin the Chronicles of Tinemouth priory give this account: "A. D. 1179, upon Chriſtmas-day at Oxenhall, in the outſkirts of Darlington, in the biſhopric of Durham, the earth raiſed itſelf up to a great height, in the manner of a lofty tower, and remained all that day until the evening, as it were fixed and immoveable, when it ſunk down with ſuch a horrid noiſe, that it terrified all the vicinity, when the earth abſorbed it, and there formed a deep pit." The diameter of the largeſt is not leſs than a hundred feet, and of the leaſt ſeventy-five, whilſt the depth is from ſix to nineteen feet; they have been conſidered by ſome to be ſhafts of neglected coal mines; by others, places where marle has been dug; but with more probability by the authors of the "Beauties of England and Wales," ſalt pits; and the name derived from the Britiſh word *hal*, an alkali, whence *halen*, ſalt; and *kiddle* or *kidle*, a dam, *i. e.* Hal-Kiddles. The riſing of the earth above ſtated may have been occaſioned from ſome exploſion of inflammable ſubſtances beneath the ſtrata. In 1805 was diſcovered a ſulphureous ſpring in the vicinity, of ſtrong medical powers; and it is now much frequented by perſons labouring under ſcorbutic and other complaints. Hutchinſon's Hiſtory of Durham, 3 vols. 4to.

DARLINGTON, a diſtrict of South Carolina, bounded S. and S.W. by Lynche's creek; about 35 miles long, and 21 broad.

DARLINGTON, a townſhip of America, in the county of Durham, Upper Canada, lying to the weſt of Clarke, and fronting lake Ontario.

DARMADIJERA, a town of Aſia, in Thibet; 3 leagues N. of Sarangpour.

DARMSTADT, a handſome town of Germany, and capital of the grand duchy of Heſſe Darmſtadt, one of the members of the confederation of the Rhine, and the ordinary reſidence of the grand duke. It is ſituated on the river of the ſame name; 18 miles S. of Frankfort on the Mayn, 21 S.E. of Mayntz, 24 N.E. of Worms, and 36 N.W. of Heidelberg. N. lat. 49° 51'. The palace is a very ſtately building, and there is a houſe built on purpoſe for military evolutions, ſufficiently capacious to admit 1500 men to perform their manual exerciſe, and accommodated with ſixteen ſtoves. See HESSE DARMSTADT.

DARNALL, a river of Wales, which runs into the Wye; 3 miles N.W. of Rhayadr Gowy.

DARNEL, in *Botany*. See LOLIUM.

DARNEL, in *Agriculture*, the name of a troubleſome weed, which is frequently met with among wheat, rye, and other crops. See LOLIUM *perenne*.

DARNEL, *Annual*, a name applied ſometimes to white darnel (*lolium arvenſe*), and what, in the ſouthern diſtricts, is often improperly termed crup. It has much ſimilarity to the red darnel, and is often miſtaken for ray, or rye-graſs, though the ſpike is much longer and paler. It is likewiſe annual, while the ray-graſs has an abiding root. The ſeeds of this troubleſome weed ripen at the ſame time with the grain, and are very injurious to wheat crops. They ſhould be carefully prevented from being ſown with the ſeed.

DARNENSIS, in *Ancient Geography*, an epiſcopal town of Africa, in Libya.

DARNETAL, in *Geography*, a ſmall town of France, in the department of the Lower Seine, not far from Rouen, remarkable for its excellent cotton manufacture, particularly of red and white printed, and of handkerchiefs of different ſizes.

DARNEY, a ſmall town of France, in the department of the Voſges, chief place of a canton, in the diſtrict of Mirecourt. It has 1033 inhabitants: but the canton contains a population of 9643 individuals, in 19 communes, upon

upon a territorial extent of 265 kiliometres. Darney lies 24 miles W. of Remiremont.

DARNI, in *Ancient Geography*, a people of Ireland, placed by Ptolemy N. of the Voluntii.

DARNIGHEIM, in *Geography*, a town of Germany, in the circle of the Upper Rhine, and county of Hanau-Munzenburg; 3 miles W. of Hanau.

DARNIS, in *Ancient Geography*, a town of the Cyrenaica, a little fouth of the promontory of Drepanum.

DAROACANA, a town of Afia, in the country of Paropumifus, fituated between the chains of Caucafus.

DAROCA, in *Geography*, a fmall, tolerably built, walled town of Spain, in the province of Arragon, on the river Xiloca, fituated in a ravin between two hills, S.S.W. of Saragoffa. Its fortifications are decayed. To the weft are mountains reckoned among the higheft in Spain; and to the north-eaft, the country is barren; but the environs of the town are fertile. It contains many religious houfes, and about 2860 inhabitants.

DAROMA, in *Ancient Geography*, a name given by Eufebius and Jerom to a canton of Paleftine, extending from the north to the fouth, from the town of Eleutheropolis, about 20 miles on the fide of Arabia Petræa, and from eaft to weft from the lake Afphaltites to Berfabea or Beer-fheba.

DARORE, in *Geography*, a town of Hindooftan, in the country of Dowlatabad; 95 miles N.W. of Beder.

DARQUE, in *Rural Economy*, a term fignifying the quantity of peats one man can caft, and two wheel in the courfe of a day.

DARRÆ, in *Ancient Geography*, a people of Arabia Felix. Ptolemy.

DARREIN, in *Law*, a corruption of the French dernier, laft, and ufed in the like fenfe: as darrein continuance, (fee Continuance); darrein prefentment (fee Assisa *darrein prefentment.*)

DARRO, in *Geography*, a river of Spain, which runs through the city of Grenada, and joins the Xenil, a little below it.

DARRYFIELD, a town of America, in the ftate of New Hampfhire; 15 miles S. of Concord.

DARSA, in *Ancient Geography*, a town of Pifidia, fituated, according to Livy, near Cormafa, N.W., near the mountains inhabited by the Solymi.

DARSINI, in the *Materia Medica of the Ancients*, a name given by fome to cinnamon. It is generally ufed by Avicenna, Serapion, and the reft of the Arabian phyficians.

DARSIS, in *Medical Writers*, is ufed for an excoriation of the fkin. Blancard.

DART, in *Aftronomy* and *Geometry*. See Sagitta.

Dart, in *Geography*, a river of Devonfhire, in England, is the principal of feveral ftreams which take their rife in the extenfive wild, called Dart-moor. Like the ancient Tigris, its name is derived from one of its moft diftinguifhing features, the rapidity of its courfe. This characteriftic it long retains, after it has left the fource at Gedleigh, as it defcends into the plain to the weft of Afhburton; where it glides, in placid beauty, by the caftle and church of Totnefs. It is navigable for fmall veffels from its mouth to about one mile above this town. A little below, receiving the tide, it rolls in majefty between lofty hills, winding its ftream at the feet of their rocky bafes; and paffing the town and caftle of Dartmouth, empties itfelf into the feas in the road of Torbay.

Dart, in a *Military Senfe*, means a fmall fpear, or javelin, much in ufe among the ancients, and yet feen among many of the more barbarous nations; efpecially where the ufe of gunpowder is little known. The Caffrees of South Africa are extremely expert in throwing the dart, called by them *Affagai*, and on many occafions have difplayed fuch accuracy in this particular, as has furprifed our moft adroit rifle-men. The dart in ufe among the ancients was of two kinds; *viz.* fpear-headed, that is, without barbs; or bearded, like the generality of arrows. The former were often attached to a long cord, which enabled the thrower to recover his weapon, where it miffed the aim, or when it could be withdrawn from a flefh-wound. Moft darts have iron heads; but the Americans, particularly in the lefs frequented tracts of that immenfe continent, as well as the inhabitants of fome parts of Africa, ufe only a hard wooden ftaff, fharpened at the point, and a little chared by means of fire; others ufe fifh-bones, flints, fea-fhells, &c. in their darts as well as for their arrows. We find the dart to be every where very fimple, and ordinarily from three to five feet in length. During the American war, the regular troops, on either fide, ufed to be greatly annoyed by thefe miffiles; which the Indian allies threw during the night at the out-centinels and videttes. Though darts are not fupplied with wings or feathers, as arrows ufually are, they fly with great force; and, by that vibratory motion, peculiar to this clafs of weapons, make very extenfive wounds, often to a great depth, and attended with uncommon inflammation.

DARTFORD, in *Geography*, is a market town in the hundred of Axton and lathe of Sutton, in the county of Kent, England. The name is derived from the river Darent, on which it is fituated. The manor was anciently a demefne of the Saxon king; and, at the time of the Norman furvey, belonged to the conqueror. Ifabella, fifter to king Henry III., was here married by proxy to the emperor Frederic, in the year 1235; and Edward III., in 1331, held a tournament at Dartford. The moft remarkable event in hiftory, refpecting this place, was the infurrection under Wat Tyler, in the fifth year of king Richard II.; owing to the infolence of a tax-gatherer, on which occafion the people of this town were incited to rife, to revenge the affront. Rapin erroneoufly ftates the infurrection to have begun at Deptford. Edward III. founded a nunnery at Dartford in the year 1355, and placed it under the government of four preachers. Its annual revenues at the diffolution, according to Dugdale, amounted to 380*l.* 9*s.* 0½*d.* Henry VIII. converted it into a royal refidence. It is called the place-houfe, and a large embattled gate-way of brick is yet remaining. The church ftands near the river, and is a fpacious edifice, confifting of a nave, chancel, and aifles, with an embattled tower at the weft end. On the north fide of the chancel is a mural monument, commemorative of fir John Spielman, a German, who, in the reign of Elizabeth, firft introduced the manufacture of paper into this kingdom.

A branch of the Roman road, called Watling-ftreet, paffed through this town. The principal ftreet is broad, from which branch off two others at right angles; in which are many good fhops, and a bridge over the river, that, about thirty years ago, was widened and rendered more commodious at the expence of the county. The flourifhing ftate of the town has chiefly arifen from the different mills which have been erected here for manufacturing gun-powder and paper. The original paper-mill, erected by fir John Spielman, about half a mile above the bridge, occupied the fite of the prefent powder-mills; and another mill, at a fhort diftance below, ftands where Geoffroy Box of Liege erected, as early as the year 1590, a mill for flitting iron bars into rods. The town has a well-fupplied market weekly, on Saturday, and a fair on the 2d of Auguft. The number of houfes, as appears by the returns made under the late act of 1800, amounted

amounted to 468; occupied by 2406 inhabitants. See Hafted's Hift. of Kent.

DARTMOOR, in the county of Devon, England, is a large wafte and foreft, extending from Cheyford, near the banks of the Tamar, to Taviftock, in the vale of Exeter. The length is about twenty miles, and the breadth fourteen; and includes between two and three hundred thoufand acres of open, uncultivated lands. The furface is wildly and wonderfully varied. It fwells in bold eminences from fifteen to eighteen hundred feet high, and again defcends into hollow glens and cavities. Approaching from the fouth and fouth-eaft, the eye is bewildered by viewing an extenfive tract, exhibiting fudden hills, called *torrs*, furfaces covered with immenfe rugged rocks, and vaft maffes of granite, which lie fcattered around, as though precipitated from the declivities into the vallies beneath. So confufedly are thefe huge fragments ftrewed, and fo varied their appearance, that they have been compared to ftones ejected from volcanoes, and wrecks of primæval mountains, torn in pieces by the "war of elements." In the higher parts of the moor, to the north-weft, are large tracts of fwampy land, exceedingly dangerous to cattle, which depafture the fcanty herbage; but yield a conftant fupply of fuel to the poor cottagers, from the immenfe beds of peat, which lie beneath the furface. The inhabitants are called *moormen*, who keep a few fheep and cattle on the moor, and look after the flocks and herds of others. The right of depafturage belongs to different interefts. The foreft, ftrictly fo called, is the property of the prince of Wales, as parcel of the duchy of Cornwall; but the outfkirts are appendant to the furrounding manors: fome of which claim a right by prefcription of common within the foreft, by paying a fmall annual fum to the duchy, called *venville* or *fenfield* money.

Though, as the name fuggefts, it was once well clothed with timber, the only remaining natural wood is an affemblage of dwarf fcrubby oaks, interfperfed with mountain-afh trees, willows, and underwood. Within a few years, fome thoufands of acres have been grubbed up, and numerous young plantations formed. Much land has alfo been converted into tillage by the command of his royal highnefs, under the direction of colonel Tyrwhit. *Cruckern Tor* has long been celebrated as the place where the ftannary-courts, or parliaments, were held for this county; whence Mr. Polwhele conjectured, that it had been a feat of Britifh judicature prior to the Roman invafion.

On this moor there is now erecting a large prifon, which is intended to be appropriated to thofe unfortunate perfons who are captured in times of war. The building is upon an immenfe fcale, and is erecting from the defigns of Mr. Alexander, a fcientific architect. At various places on this extenfive tract, are the fhafts of feveral exhaufted and neglected tin mines; and in the vicinity of Taviftock are fome now working. See Polwhele's Hiftory of Devonfhire; alfo the Beauties of England and Wales, vol. iv.

DARTMOUTH, is a borough, fea-port, and market town, in the county of Devon, England; 30 miles diftant from Exeter, and 203½ weft from London. It formerly was the property of Judhael de Totnefs, to whom the manor was granted by the Conqueror. The town firft fent members to parliament in the time of Henry I.; but not regularly till the reign of Edward III., who granted it a charter of incorporation; under which authority it is governed by a mayor, recorder, two bailiffs, and twelve common-council men, with other inferior officers. In the corporation is vefted the right of election, and the power of creating burgeffes. This place was deftroyed by fire in the reign of Richard I., and again in the reign of Henry IV. In both inftances it was by French incendiaries, who efcaped with little lofs; but attempting it a third time, in the year 1404, they were intercepted by the peafantry and women; and the whole party either killed or taken, with their leader, Monf. de Coftell. The town originally confifted of three villages, Clifton, Dartmouth, and Hardnefs; and, though united by buildings, yet in many refpects, as to local regulations, they were diftinct. From the natural fituation of the place, a craggy hill, many of the ftreets are aukward, and moft of them incommodioufly narrow, and the lower tier of houfes frequently communicates with thofe above by flights of fteps. The principal one which faces the quay, is occupied by the merchants. Dartmouth has three churches, and a meeting-houfe for diffenters. St. Clement's church is fituated upon a hill above the town, and having a tower 70 feet high, forms an excellent fea-mark. Here are three charity fchools for the education of poor children.

The river Dart, opening into a fine eftuary, forms an excellent and fafe harbour, fufficiently capacious to admit five hundred fail of fhipping. The entrance is defended by a caftle, and two fortified platforms; but the fortrefs is not large, and few guns are mounted. A number of veffels are employed in the pilchard-fifhery, and the town has an export trade from Newfoundland to the Mediterranean; whence it imports wine, oil, fruits, &c. The number of fhips belonging to this port is about 350, which gives employment to upwards of 3000 men; a certain number of whom the proprietors are obliged by law to felect from landfmen, by which means the trade becomes an excellent nurfery for the navy. The regular market is on Friday, but a well fupplied fifh-market is held every day, except Sunday. By the returns under the late act, the number of houfes was 460, and inhabitants 3412.

To the north of the harbour lies Torbay, the celebrated and general rendezvous of the Britifh grand fleet; where, in unfavourable weather, it generally comes to an anchor, and rides in fafety during the ftorm. At the lower part of the bay, on the finely-wooded fhore, is the ftately manfion of George Carey, efq. called Tor Abbey, formerly a religious houfe, founded by William de Bruer, in the time of king John; part of the ruins yet remain. And in the parifh is Kentfhole, a feries of caverns, connected by fubterraneous paffages, about 1100 feet from the entrance, through one of which paffes a rivulet.

DARTMOUTH, a town of America, in the ftate of New Hampfhire, and county of Grafton, N.W. of the foot of the white mountains; 33 miles N.E. of Haverhill, and 87 W. of Portfmouth. In 1790, it contained 111 inhabitants, and was incorporated in 1772.—Alfo, a thriving fea-port town in the county of Briftol, and ftate of Maffachufetts, fituated on the W. fide of Accufhnet river, 62 miles foutherly of Bofton, incorporated in 1664, and containing 2660 inhabitants. N. lat. 41° 37'. W. long. 70° 52'.—Alfo, a town of Elbert county in Georgia, fituated in the peninfula formed by the confluence of Broad and Savannah rivers, two miles from fort James, Dartmouth, a mile below Charlotte fort. The town and fort derive their names from James, earl of Dartmouth, who obtained a grant and powers to the Indian trading company in Georgia to treat with the Creeks for the territory called the "New Purchafe," ceded in difcharge of debts due to the traders. This treat contains about 2,000,000 acres, lying upon the head of the great Ogechee, between the banks of the Savannah and Alatamaha, touching on the Oconee, including all the waters of Broad and Little rivers. This territory comprehends excellent fertile land, well watered by many rivers, creeks, and brooks.

DARTMOUTH *College*. See COLLEGE.

DARTOS, in *Anatomy*, a fuppofed mufcular expanfion, defcribed as exifting between the integuments of the fcrotum and

and the teftes. It is well known that the application of cold to the furface of the body produces a corrugation of the fcrotum; and this motion was afcribed by the older anatomifts to mufcular fibres exifting in the fituation juft alluded to. The more accurate inveftigations of the moderns have decided, that this fuppofed mufcular dartos is nothing but fimple cellular texture, which being entirely free from fat, and thereby poffeffing a ftringy and fibrous appearance, and often having a reddifh colour from the numerous blood-veffels, whofe ramifications it contains, contracts an appearance fomewhat refembling that of mufcular fibres. The motion taking place under the cirucumftances of cold applied externally, &c., feems to be analogous to what occurs in the furface of the body in general; where a contracted ftate of the integuments is produced, together with a peculiar roughnefs of the fkin, giving rife to the appearance called cutis anferina, and taking place independently of any mufcular contraction.

DARU, in *Botany*, a name given by Avicenna and Serapion to a fpecies of turpentine tree; which the latter author calls the lentifk. This grew up to a very large tree, and bore a much larger and more beautiful fruit than the common turpentine-tree.

Daru, in *Geography*, a town of Perfia, in the province of Kerman; 90 miles N. E. of Sirgian.

DARVERNUM, in *Ancient Geography*. See Durovernum.

DARWAR, or Danwar, in *Geography*, a confiderable fortrefs of Hindooftan, in the country of Sanore, one of Tippoo's frontier towns, towards the dominions of the Pafhwah; 88 miles S. of Vifiapour, and 90 E. N. E. of Goa. N. lat. 16° 5'. E. long. 75° 9'.

DARWEN, a river in England, in the county of Lancafter, which runs into the Ribble, near Prefton.

DARWENT. See Derwent.

DARWIN, Erasmus, in *Biography*, equally famed as a phyfician and a poet, was a native of Elton, near Newark, Nottinghamfhire, where he was born December 12, 1731. After going through the ufual fchool education, under the Rev. Mr. Burrows, at the grammar-fchool at Chefterfield, with credit, he was fent to St. John's College, at Cambridge. There he only continued until he took his bachelor's degree in medicine, when he went to Edinburgh, to complete his ftudies; which being finifhed, and having taken the degree of doctor in medicine, a profeffion to which he was always attached, he went to Litchfield, and there commenced his career of practice. Being fent for, foon after his arrival, to Mr. Inglis, a gentleman of confiderable fortune in the neighbourhood, who was ill with fever, and in fo dangerous a ftate, that the attending phyfician had given up the cafe as hopelefs, the doctor had the good fortune to reftore him to health. This gave him fo high a degree of reputation at Litchfield, and in the neighbouring towns and villages, that his competitor, who was before in confiderable practice, finding himfelf neglected, and nearly deferted, left the place. Dr. Darwin foon after married Mifs Howard, the daughter of a refpectable inhabitant of Litchfield, by which he ftrengthened his intereft in the place. By this lady he had three fons, who lived to the age of manhood; two of them he furvived; the third, Dr. Robert Waring Darwin, is now in confiderable practice as a phyfician at Shrewfbury. In 1781, our author having married a fecond wife, removed to Derby, where he continued to refide to the time of his death, which happened on Sunday the 18th of April, 1802, in the feventieth year of his age. Six children by his fecond lady, with their mother, remain to lament the lofs of him.

The doctor was of an athletic make, much pitted with the fmall-pox. He ftammered much in his fpeech. He had enjoyed an almoft uninterrupted good ftate of health, until towards the conclufion of his life, which he attributed, and reafonably, to his temperate mode of living, particularly to his moderation in the ufe of fermented liquors. This practice, he recommended ftrenuoufly to all who confulted him. Mifs Seward, from whofe Memoirs of the Life of Dr. Darwin thefe notices are principally taken, gives him the credit of having introduced habits of fobriety among the trading part of Litchfield, where it had been the cuftom to live more freely, before he went to refide there.

His frequent journies, into the country on profeffional bufinefs, contributed alfo in no fmall degree to the prefervation of his health and his faculties, which latter remained unimpaired to the day of his death. His death was fudden, occafioned by a fit of what he was ufed to call angina-pectoris, which he had feveral times experienced, and always relieved by bleeding plentifully.

As Dr. Darwin was a votary to poetry, as well as medicine, he occafionally fent his effufions in that way, to one or other of the monthly publications, but without his name, conceiving, from the example of Akenfide and Armftrong, that the reputation he might acquire by his poetry, would operate as a bar to his advancemeut in the practice of medicine. His "Botanic Garden," in which he celebrates what he calls the Loves of the Plants, the firft of his poems to which he put his name, was not publifhed until the year 1781, when his medical fame was fo well eftablifhed, as to make it fafe for him to indulge his tafte in any way he fhould chufe. Befides, the poem was fo amply furnifhed with notes, containing the natural hiftory, and accounts of the properties of plants, that it did not feem very alien from his profeffion. The Botanic Garden is comprifed in two parts. In the firft the author treats of the Economy of Vegetables, in the fecond of the Loves of the Plants. The novelty of the defign, the brilliancy of the diction, full of figurative expreffions, in which every thing was perfonified, rendered the poem, for fome years, extremely popular. But the fame which it acquired has in a great degree fubfided, and it is now little noticed. It is probable, that an ingenious little poem, the Loves of the Triangles, publifhed in a monthly journal, which is a happy imitation of the Darwinian manner, contributed to its decline.

In 1793, the author publifhed the 1ft volume of "Zoonomia, or the Laws of organic Life," 4to. The 2d volume which completed the author's plan, was printed in the year 1796. As the eccentric genius of the author was known, great expectations were formed of this work, the labour we were told of more than twenty years. It was to reform, or entirely new model, the whole fyftem of medicine, profeffing no lefs than to account for the manner in which man, animals, and vegetables are formed. They all, it feems, take their origin from living filaments, fufceptible of irritation, which is the agent that fets them in motion. Archimedes was wont to fay, give me place to ftand on, and I will move the earth. Such was his confidence in his knowledge of the power of the lever. Our author faid, give me a fibre fufceptible of irritation, and I will make a tree, a dog, a horfe, a man. "I conceive," he fays, Zoonomia, vol. i. p. 492, "the primordium, or rudiment of the embryon, as fecreted from the blood of the parent, to confift in a fingle living filament, as a mufcular fibre, which I fuppofe to be the extremity of a nerve of loco-motion, as a fibre of the retina is the extremity of a nerve of fenfation; as, for inftance, one of the fibrils which compofe the mouth of an abforbent veffel; I fuppofe this living filament, of whatever form it may be, whether fphere, cube, or cylinder, to be endued with the capacity of being excited into action, by certain kinds of ftimulus. By the ftimulus of the furrounding fluid in which it is received from

from the male, it may bend into a ring, and thus form the beginning of a tube. This living ring may now embrace, or abforb a nutritive particle of the fluid in which it fwims, and by drawing it into its pores, or joining it by compreffion to its extremities, may increafe its own length or craffitude, and, by degrees, the living ring may become a living tube. With this new organization, or accretion of parts, new kinds of irritability may commence," &c.; whence, fenfibility which may be only an extenfion of irritability, and fenfibility further extended, beget perception, memory, reafon, and in fhort all thofe faculties which have been, it feems, erroneoufly attributed to mind, for which, it appears, there is not the fmalleft neceffity; and as the deity does nothing in vain, of courfe fuch a being does not exift. It would be ufelefs to enter into a further examination of the Zoonomia, which has long ceafed to be popular; thofe who wifh to fee a complete refutation of the fophifms contained in it will read with fatisfaction, "Obfervations on the Zoonomia of Dr. Darwin, by Thomas Brown, Efq." publifhed at Edinburgh in 8vo. in 1798. In 1801, the author publifhed Phytologia, or the Philofophy of Agriculture and Gardening; but the public, tired with the reveries of the writer, let this large book of 600 pages in 4to. pafs almoft unnoticed. As little attention was paid to a fmall tract on female education, which had little indeed to attract notice. "It is," Mifs Seward obferves, "a meagre work, of little general intereft, thofe rules excepted which are laid down for the prefervation of health." It is however harmlefs, a character that can by no means be accorded to the Zoonomia, as may be gathered from the ftrictures we have thought it neceffary to pafs on that work. Seward's Memoirs of the Life of Dr. Darwin; alfo Medical Commentaries and Annals.

Darwin, Mr. Charles, one of the fons of Dr. Erafmus Darwin, who died at Edinburgh the 15th of May, 1778, while profecuting his ftudies in medicine, deferves to be noticed, for having difcovered a teft, diftinguifhing pus from mucus, for which a gold medal was adjudged him by the univerfity. "As the refult of numerous experiments," he fays, "when any one wifhes to examine the matter expectorated by his patient, let him diffolve a portion of it in vitriolic acid, and another portion of it in cauftic alkaline lixivium, and then add pure water to both folutions; if there is a precipitation in each folution, it is clear the expectorated matter is pus; if there is no precipitation, the matter is fimply mucous. Mr. Darwin left an unfinifhed effay on the retrograde motion of the abforbent veffels of animal bodies in fome difeafes. This was, fome time after the death of the young man, publifhed by his father, together with the differtation for which he had obtained the prize medal.

DASÆ, in *Ancient Geography*, a town of Arcadia, the mines of which contributed to the aggrandizement of Megalopolis; which lay N.E. of it.

DASCHITZ, in *Geography*, a town of Bohemia, in the circle of Chrudim; 7 miles N.N.E. of Chrudim.

Daschitz, or *Datfchitz*, a town of Moravia, in the circle of Iglau; 6 miles N. of Zlabins.

DASCILITIDES, in *Ancient Geography*, a lake of Afia Minor, in Myfia; which, according to Plutarch, was near Cyzicum. This lake belonged partly to the Byzantins, and partly to the Cyzicenians, according to Strabo. It was alfo called *Aphnites*.

DASCON Sinus, a gulf fo called by Diodorus, which lay on the eaftern coaft of Sicily, near Syracufe.

DASCUSA, a town of Afia, feated on the banks of the Euphrates, having 38° 15′ of latitude.

DASCYLIUM, Diaskileo, a town of Afia in Bithynia, fituated near the lake Dafcilitides. Steph. Byz. mentions four other towns of this name; one founded foon after the city of Troy; another in Ionia; a third of Caria; and a fourth on the confines of the Eolide and Phrygia.

DASHUR, in *Geography*, a town of Egypt; 15 miles S. of Cairo.

DASSARATÆ, in *Ancient Geography*, a people placed by Plutarch towards the confines of Macedonia and Illyria, near the river Lycus.

DASSAWN, in *Geography*, a river of Hindooftan, which runs into the Betwha; 16 miles W. of Raat.

DASSDORF, a fmall town of Saxony, in the principality of Saxe-Weimar.

DASSEL, a fmall town of the kingdom of Weftphalia, in the late principality of Hildefheim, which was affigned as an indemnity to Pruffia by the treaty of Luneville, and loft again by Pruffia at the peace of Tilfit. Daffel is fituated in a deep vale on the Spoling, which not far from thence flows into the river Ilme, in a fertile diftrict called the Hundefruck.

DASSEN, an ifland in the Atlantic, near the coaft of Africa, between the Cape of Good Hope and Saldanha bay. S. lat. 33° 26′. E. long. 72°.

DASTARGEDA, or Artemita, in *Ancient Geography*, *el-Melik*, a town of Afia, on the left bank of the river Delas, north of its mouth in the Tigris, and S.W. of Apollonia. Chofroes, king of Perfia, had a palace in this town, which he preferred to that of Ctefiphon. This palace was deftroyed by Heraclius.

DASTIRA, a town of Armenia Major. Strabo.

DAST-Surab, in *Geography*, a town of Perfia, in the province of Farfiftan; 70 miles S. of Schiras.

DASYMMA, a fuperficial inequality of the inner part of the eye-lids, accompanied with a rednefs. Blancard derives it from δασυς, *hirfutus*.

DASYPUS, in *Zoology*, a genus of mammalia, in the bruta family. They have no tufks; the grinders are fhort, cylindrical, and from feven to eight in each jaw; and the body covered with a bony fhell divided into zones. Thefe are the armadillo of Englifh writers.

There is only a fmall number of fpecies in this genus, and thofe are chiefly inhabitants of South America. They are readily diftinguifhed from all other quadrupeds, by the fingular bony covering or fuit of banded armour with which nature has at once protected and adorned thefe curious animals; their fhelly coat being of confiderable ftrength, and fo admirably contrived as to accommodate itfelf to every pofture and motion of the body. The armadillos are of a gentle difpofition, and inhabit fubterraneous retreats or burrows, which they eafily excavate by means of their large and ftrong claws. They feed on roots, melons, potatoes, grain, flefh, infects, and worms, in queft of which they wander abroad chiefly in the night time, as they reft during the day in their burrows and hiding-places. As they are themfelves confidered excellent food, they are fought after, and dug out of their fubterraneous cavities, and fold for the table. They are, however, only the young armadillos which are in requeft for this purpofe; for as they grow old, the flefh acquires a ftrong mufky fcent, which renders them very difagreeable. When attacked, the armadillos roll themfelves up into the form of a ball, and are thus fecured in an effectual manner from ordinary accidents. They are faid to drink frequently, and often grow extremely fat; they are alfo reprefented to be extremely prolific, producing a brood of feveral young every month, or at leaft three or four times in a year. The fpecies are diftinguifhed principally by the number of zones or bands.

Species.

Tricinctus. Bands three, moveable; toes five. Houtt. *Cataphractus scutis duobus, cingulis tribus*, Briss. *Tatou*, Redi. *Tatu s. armadillo orientalis*, Seba. *Tatu apara*, Marcgr. Three-banded armadillo.

This may be considered as one of the most elegant species of armadillo; its colour is a clear yellowish-white; the head, shoulders, and posterior part of the body are coated with regular hexagonal divisions, curiously studded or tuberculated on the surface, and the zones of the body are extremely distinct; the tail is thick and short; the legs are covered with hexagonal divisions or segments, similar to those on the shoulders, but smaller; the ears are rather large; and the claws smaller than in most other species. This kind is a native of Brazil, and feeds on fruits and poultry.

Quadricinctus. Bands four. Gmel. *Cataphractus*, Briss. *Chæloniscus*, Column.

An uncertain species, by some conceived to be a variety of the former.

Sexcinctus. Bands six; feet five-toed; Linn. Schreber, &c. *Tatu et tatu-paba Brasiliensibus*, Marcgr. *Encouvert ou tatou à six bandes*, Buff. Six-banded armadillo.

Resembles dasypus tricinctus, but is furnished with six bands instead of three; the tail is very thick at the base, and short in proportion to the animal; the claws large and strong. The general colour is reddish-yellow. It infests plantations in South America; is eatable, and feeds on fruits and roots. A supposed variety of this kind, in the British Museum, having eight instead of six bands, may probably prove to be a distinct species.

Septemcinctus. Bands seven; toes on the anterior feet four: posterior feet five. Linn. *Tatus quadrupes peregrina*, Gesn. Seven-banded armadillo.

Inhabits India and South America; and is believed to be a variety of the nine-banded armadillo.

Octocinctus. Bands eight; shields two. Schreber. *Cataphractus scutis duobus, cingulis octo*, Briss. *Aiatochtli*, Hernand. *Tatouette ou tatou à huit bandes*, Buff. Eight-banded armadillo.

This kind inhabits Brazil, and is esteemed delicious. The shields are sprinkled with prominent white knobs; belly whitish; supposed to be a variety of the following species:

Novemcinctus. Bands nine; anterior feet four-toed; posterior feet five-toed. Linn. *Tatus*, Gesn. *Cachicame, ou Tatou à neuf bandes*, Buff. Nine-banded armadillo.

The flesh of this species is delicate. The crust on the shoulders, rump, and head marked with six-sided figures. It inhabits South America.

Duodecimcinctus. Bands twelve; toes five. *Dasypus unicinctus*, Linn. *Tatu seu armadillo africanus*, Seba. *Kabassou ou tatou à douze bandes*, Buff.

The length of this animal from the nose to the tail is about a foot, and the tail nearly seven inches long. An armadillo, supposed to be a variety of this, is mentioned by Pennant under the name of the greater twelve-banded armadillo, which measures from the tip of the nose to the tail two feet ten inches, and the tail twenty inches. The head in both kinds is remarkably blunt, and the ears large.

18-Cinctus. Bands eighteen. *Cirquincon, ou Tatou à dix-huit bandes*, Buff. Eighteen-banded armadillo. Penn.

Described by Grew in the last century under the name of the weazel-headed armadillo, from a specimen in the museum of the Royal Society.

It appears to be allied to the twelve-banded armadillo, and does not seem to be figured by any author except Grew.

DASYS, Δασυς, dense, thick, close, rough, in Prorrhet. and Coac. is an epithet for a tongue condensed, contracted, and exasperated with heat and dryness, as it happens in phrensies. James's Med. Dict.

DATA, in *Mathematics*, certain things, or quantities, supposed to be given, or known, in order, from them, to find out other things or quantities, which are unknown, or sought for. A problem, or question, generally consists of two parts; data and quæsita.

Euclid has an express treatise of data; wherein he uses the word for such spaces, lines, and angles, as are given in magnitude, or to which we can assign others equal.

From the primary use of the word data in mathematics, it has been transplanted into other arts; as philosophy, medicine, &c. where it expresses any quantity, which, for the sake of a present calculation, is taken for granted to be such, without requiring an immediate proof for its certainty; called also the given quantity, number, or power. And hence also such things as are known, from whence either in natural philosophy, the animal mechanism, or the operation of medicines, we come to the knowledge of others unknown, are now frequently in physical writers called data.

DAT-AL-SAMIN, in *Geography*, a town of Arabia, 250 miles of Cathem.

DATAMES, in *Biography*, a distinguished military commander, who first served among the guards of Artaxerxes Mnemon, and was afterwards employed in the war against the Cadusians. In this business he gained so much credit, and so high a name, that he was appointed governor of that part of Cilicia which borders upon Cappadocia. Datames was afterwards appointed to reduce Thyus, who had revolted against the king: he performed the duty, and took his opponent prisoner, who was a very tall and stout man, and of a terrible aspect. He caused him to be dressed in the robes of a satrap, and decorated with a gold chain and bracelets, and at the same time, putting himself into the rustic attire of a huntsman, with a club in one hand, and a cord in the other, to which Thyus was fastened, led him into the royal presence as if he were a wild beast. The king was highly pleased with the incident, and appointed Datames to be chief in the Egyptian war; but while preparations were making, he was ordered to go in quest of Aspis, who had revolted from his allegiance. The success and high merit of Datames excited the envy of the courtiers, who combined to ruin him. Datames, apprized of their intentions, resolved to be before hand with them, by quitting the king's service, and making himself independent. His own son was the first to carry the news to court of his father's rebellion. The king sent against him a very numerous army, but it was unsuccessful, and the most it could extort was the nominal submission of Datames, who in every engagement proved himself the superior. Artaxerxes could not be reconciled to the rebellious general, and as he found himself incapable of conquering him, he determined to adopt the means of treachery, by which he finally accomplished his end. Datames was assassinated by the hands of Mithridates, who, in concert with the king, pretended to be an open enemy of his sovereign, while he was seeking the means of performing what lay nearest his heart. Cornelius Nepos.

DATE, an addition, or appendage, in writings, acts, instruments, letters, &c. expressing the day and month of the year, when the act, or letter, was passed or signed; together with the place where the same was done.

The word is formed from the Latin datum, given, the participle of do, I give. The Latins usually say dabam, I gave.

In writings of importance the date should be written in words

words at length; dated or given at London this twenty-fixth day of March, in the year of our Lord one thoufand feven hundred and fifty. In letters, the date is ufually in figures; London, March the 26th, 1750.

An antedate is a falfe date, prior to the real time when the inftrument was paffed, or figned.

A poft-date, is that pofterior to the real time, &c.

Our ancient deeds had no dates, but only the month and year, to fignify that they were not made in hafte, or in the fpace of a day, but upon longer and more mature deliberation. The king's grants began with thefe words, "Præfentibus & futuri, &c." but the grants of private perfons with "Omnibus præfentes literas infpecturis, &c."

A deed is good though it mentions no date, or hath a falfe date: or even if it hath an impoffible date, as the 30th of February; provided the real day of its being dated or given, that is, delivered, can be proved. Blackft. Com. vol. ii. p. 304.

DATE, *Dactylus*, the fruit of the palm-tree. See PHŒNIX.

The word is formed of dacte, and that of dactylus, finger; as being round and oblong, refembling a finger's end.

This fruit is gathered in autumn, before it is ripe; and bears a near refemblance to our bullace; being of a green colour, and very fharp and aftringent. When ripe, it becomes ruddy, having a hard, longifh ftone, cloven at bottom, and encompaffed with a thin white pellicle, or fkin.

The hufk, or covering of the date, called by the ancients elate, or fpatha, when the fruit is in its growth, is variable; having as many changes of colour as the fig has. Some dates are black, fome white, fome brown; fome again are round like apples, and very big. Ordinarily they are oblong, flefhy, yellow, fomewhat bigger than the thumb's end, and fome are very agreeable to the tafte. Some are no bigger than a chich-pea, and others as big as a pomegranate. The beft are thofe called royal dates. There is alfo another fort called caryotæ, which are very good. Some of them have ftones, and others none.

Our dates are brought us from Egypt, Syria, Africa, and the Indies. Among the Egyptians and Africans they make a principal article of food. They never come to full maturity in Italy, or the moft fouthern parts of Spain; and yet there are tolerable dates in Provence; which do not keep, but breed worms. The beft come from Tunis and Perfia.

DATE-*palm*, in *Botany*. See PHOENIX.

DATE *plum*. See DIOSPYROS.

DATES, *Land of*. See BILEDULGERID.

DATHOLITE. The colour of this mineral is greyifh and greenifh white, paffing into mountain-green. It occurs in mafs, and cryftallized in fmall rectangular tetrahedral prifms with truncated angles. It is tranflucent. Its luftre internally is fhining, between vitreous and refinous. Its fracture is fmall and imperfectly conchoidal. It prefents large and coarfe granular concretions. It is confiderably hard. Sp. gr. 2.98.

It is compofed, according to Klaproth, of

365	Silex
35.5	Lime
24.	Boracic acid
4.	Water.
100.	

It has been recently difcovered by Efmark, at Arendahl in Norway.

DATHTHA, in *Ancient Geography*, a town of Afia, in the interior of Media. Ptolemy.

DATISCA, in *Botany*, baftard hemp. Linn. Gen. 530. Schreb. 700. Willd. Sp. Pl. v. 4. 823. Juff. 445. Gærtn. t. 30. Clafs and order, *dioecia dodecandria*. Nat. Ord. uncertain.

Gen. Ch. Barren fl. *Cal.* of five equal, linear, acute leaves. *Cor.* none. *Stam.* Filaments about 15, very fhort; anthers oblong, obtufe, much longer than the calyx. Fertile fl. *Cal.* fuperior, of two teeth, erect, minute, permanent. *Cor.* none. *Pift.* Germen oblong, inferior; ftyles three, fhort, cloven; ftigmas fimple, oblong, fhaggy, *Peric.* Capfule prifmatic, three-pointed, with three valves and one cell. *Seeds* numerous, fmall, ranged along three, four, or five linear, parallel ribs in the capfule.

Eff. Ch. Barren fl. Calyx five-leaved. Corolla none. Anthers fifteen, oblong, nearly feffile. Fertile fl. Cal. of two teeth. Cor. none. Styles three. Capfule inferior, triangular, three-horned, pervious, of one cell, with many feeds.

Of this genus there are two fpecies. D. *cannabina*, (Cannabis lutea fertilis; Alpin. Exot. t. 298.) has a fmooth ftem, and grows in Crete. It is perennial, herbaceous, feveral feet high, with much of the habit of hemp, fee CANNABIS; but the flowers are yellow and more confpicuous than thofe of that ufeful plant. Leaves alternate, pinnate, jagged. It flowers after midfummer, and is propagated by parting the roots in autumn, as well as by feeds; but the latter can only be perfected when the barren and fertile plants are cultivated together, whence Linnæus drew one proof of his doctrine of the fexes of plants. See his Differtation on that fubject, publifhed in Englifh, Lond. 1786, 8vo. D. *hirta*, a larger fpecies, with a hairy ftem, is found in Pennfylvania. This differs little in general appearance from the former.

DATISI, in *Logic*, a mode of fyllogifms in the third figure, wherein the major is an univerfal affirmative, and the minor and conclufion are particular affirmative propofitions. E. gr.

DA "All God's friends are kings."
TI "Some of God's friends are poor."
SI "Therefore, fome poor are kings."

DATIVE, in *Grammar*, the third cafe in the declenfion of nouns; expreffing the ftate or relation of a thing, to whofe profit or lofs fome other thing is referred.

It is called dative, becaufe ufually governed by a verb implying fomething to be given to fome perfon. As, commodare Socrati, to lend to Socrates; utilis reipublicæ, ufeful to the commonwealth; perniciofus ecclefiæ, pernicious to the church; vifum eft Platoni, it feemed to Plato, &c.

In Englifh, where we have properly no cafes, this relation is expreffed by the fign to or for.

DATOS, or DATON, in *Geography*, a town of Europe, which, after having belonged to Thrace, was transferred to the king of Macedonia, when the empire was extended on that fide; it was fituated near mount Pangæa, on a craggy hill, having a foreft to the north, and to the fouth a lake or marfh, at a fmall diftance from the fea; to the eaft there were defiles, and to the weft, a fertile and pleafant plain, which extended as far as Strymon. Fabulous tradition fays, that Proferpine was gathering flowers here when fhe was forcibly carried away by Pluto. This place was proverbially rich, on account of the mines of gold in its territory. It was at firft called *Cremides*, from the fountains that abounded in the hill on which it was built; and afterwards, as is faid, Calliftratus the Athenian gave it the name of Datos. When Philip, king of Macedon, took poffeffion of it, he fortified

it,

it, and called it Philippi. It became famous for the battle fought under its walls between the troops of Brutus and Caffius, and for thofe of Octavius. The territory, on which are feen the ruins of Philippi, is now called *Philipp-ghi*, Φιλιππε γη, that is, the land of Philippi.

DATTEAH, a town of Hindooftan, in the circar of Gohud; 96 miles S. of Agra.

DATURA, in *Botany*, thorn-apple (from the American name of this plant, of fimilar found, made claffical by Linnæus from *do*, *dare*, *daturus*, becaufe it is *given* as a ftimulant). Linn. Gen. 98. Schreb. 3. Willd. Sp. Pl. v. i. 1007. Juff. 125. Clafs and order, *pentandria monogynia*. Nat. Ord. *Luridæ*, Linn. *Solaneæ*, Jufs.

Gen. Ch. *Cal.* of one leaf, inferior, tubular, five-angled, five-toothed; its bafe permanent. *Cor.* of one petal, funnel-fhaped; tube cylindrical, about as long as the calyx; limb dilated, plaited, with five angles, and five little acute teeth. *Stam.* Filaments five, equal, awl-fhaped, inferted into the tube of the corolla, and fhorter than its limb; anthers oblong, flattened, obtufe. *Pift.* Germen ovate, fuperior; ftyle thread-fhaped, ftraight; ftigma obtufe, of two plates. *Peric.* Capfule ovate, ftanding on the bafe of the calyx, of two cells and four valves; receptacles tranfverfe with refpect to the partitions, dilated, dotted. *Seeds* numerous, kidney-fhaped.

Eff. Ch. Corolla funnel-fhaped, plaited. Calyx tubular, angular, partly deciduous. Capfule fuperior, of two cells and four valves.

D. *ftramonium*, common thorn-apple, Engl. Bot. t. 1288. Curt. Lond. fafc. 6. t. 17. though originally a native of America, is now a frequent weed on dunghills and cultivated ground in various parts of Europe. It is an annual, of rank growth, and of a fœtid fmell when bruifed. Leaves flaccid, ovate, finuated, alternate. Flowers folitary, ftalked, white, fragrant at certain times. Fruit very fpinous. Its qualities are narcotic and dangerous. D. *faftuofa*, purple thorn-apple, from the Eaft Indies, is cultivated in our ftoves for the fake of its flowers, which are handfome, fragrant, purple without, white within, and often furnifhed with a triple corolla. D. *arborea*, tree thorn-apple, is a magnificent arborefcent fpecies, a native of Peru and Chili, whofe white flowers expand only at night, when they are very fragrant. Each is often two feet in length, and we have feen 150 open at a time on one tree. Leaves oblong, nearly entire. Capfules fmooth. It is eafily cultivated in a bark ftove, where it foon becomes a weed. Six or feven more fpecies are known.

DATURA, in *Gardening*, comprifes plants of the herbaceous flowery annual kind; of which the fpecies moftly cultivated are the common thorn-apple (D. *ftramonium*), the blue thorn-apple (D. *tatuta*), the purple thorn-apple, (D. *faftuofa*), the hairy thorn-apple (D. *metel*), and the tree thorn-apple. Thefe are moftly tall growing plants not very difficult of culture.

Method of Culture.—Thefe are plants which are propagated annually, by fowing the feeds of the two firft or hardy forts in the clump-borders, or other places where the plants are to remain, in patches of four or five together, covering them in to the depth of nearly half an inch. When the plants are up, the weakeft fhould be removed, fo as to leave only one or two of the ftrongeft in each place; but the feeds of the latter or tender forts fhould be fown in the fpring feafon, as the latter end of March or beginning of the following month, either on a hot-bed covered by frames and glaffes, or in pots, and managed as other tender annuals, admitting air to them freely in their early growth, and when fome inches high, removing them into feparate pots, replunging them in the hot-bed, fo formed as to draw them up to a pretty tall-growth. When the weather becomes fettled warm, as about June, they may be removed into the open air, being previoufly hardened in a gradual manner by due expofure, either in the pots, or planted out in the borders or other places, with balls of earth about their roots. The two firft kinds are the beft fuited to the laft method of management.

Both the firft and fecond fpecies are adapted to the large borders of pleafure-grounds, where they have a good effect in mixture with others of a fimilar growth; but the firft is fometimes troublefome as a weed. The other kinds, from the beauty of their flowers, produce a pleafing variety in affemblage with other potted annual plants.

DATURA *Stramonium*, in the *Materia Medica*. The whole of this plant is powerfully narcotic and poifonous. It was firft introduced into medicine by Dr. Stoerck, and employed by him in feveral cafes of mania with fuccefs. It is occafionally employed in epileptic and other convulfive diforders, fometimes with obvious advantage. The preparation commonly ufed is the infpiffated juice, of which, if recent and well prepared, the firft dofe fhould be not more than a quarter of a grain, which may be flowly increafed till it produces fome degree of vertigo, headach, and difficulty of fwallowing. A remarkable degree of dilatation of the pupils and infenfibility to light alfo attend the ufe of this powerful remedy, on which account fome have fuggefted to employ it as a preparative to operations on the eye, where fixity and dilatation of the pupils are defirable; but we do not know whether this has actually been put in practice.

DAVA, or USPO, in *Geography*, a province of Japan.

DAVACA TERRÆ, a portion of land in Scotland, fo called; et apud prifcos Scotos, dawach of land, quod continent quatuor aratra terræ, quorum unum quodque trahitur octo bobus.

DAVALLIA, in *Botany*, a genus of dorfiferous ferns, named by Dr. Smith in the Memoirs of the Turin Academy, in honour of Mr. Edmund Davall, F. L. S. late of Orbe, in Switzerland, a moft acute and intelligent botanift, whofe illuftrations of Swifs plants, though left at his death, in 1798, in an incomplete ftate, may one day be found worthy of being communicated to the public. Sm. in Mem. de l'Acad. de Turin, v. 5. 414. t. 9. f. 6. Tracts, 245, t. 1. f. 6. Swartz, Fil. 130. Clafs and order, *cryptogamia filices*: fect. *Annulatæ*. Nat. Ord. *Filices dorfiferæ*.

Eff. Ch. *Capfules* in roundifh, feparate dots, near the margin. *Cover* like a fcale, from the furface, diftinct, feparating outwards, terminating a vein.

The habit of this genus is firm, polifhed, and compact, not tender, membranous, and expanfive like a *trichomanes* or *adiantum*. The *involucrum* or cover is often lunate, always folitary, at each round congeries of capfules, and each capfule is embraced by a genuine, diftinct, jointed ring.

Sp. 1. D. *heterophylla*. Sm. Tracts, 250. Sw. Fil. 130. (Humata ophiogloffa; Cavan. Leccion, 273). Barren fronds ovate, acute, undivided, entire; fertile ones linear-lanceolate, finuated, many-flowered. Found in Sumatra, and alfo in the Nicobar, and Ladrone iflands. *Roots* creeping, branched, round, fcaly. *Fronds* about half an inch or an inch afunder; the barren ones on fhort ftalks, fimple, ovate, acute, undivided, entire, fmooth, about an inch and a half long, with a midrib and many fine veins; fertile ones above twice as long, but narrower, finuated like the leaf of a *pedicularis*, each lobe bearing feveral fpots of fructification, every one of which is concealed by its own kidney-fhaped *cover*. 2. D. *pinnatifida*.

 Sw.

Sw. Fil. 130. (Humata pinnatifida; Cav. Lecc. 273). Barren fronds ovato-lanceolate, acute, undivided, entire; fertile ones lanceolate, pinnatifid. *Cav.* Gathered by Louis Née in the Ladrone iflands. We know it only from Cavanilles's defcription. The barren *fronds* are faid to be more than two inches long, the fertile ones much longer, with linear fegments. 3. D. *pectinata*. Sm. Tracts, 249. Frond lanceolate, pinnatifid, pectinated; fegments obtufe, undulated, many-flowered; the lowermoft auricled, or half pinnatifid. A native of Malacca, the Nicobar iflands, and Otaheite. Its fize and habit refemble *polypodium vulgare*, but the great number and horizontal regularity of the fegments, which are very deep, approach, though imperfectly, to the beautiful *polypodium crifpum, ftruthionis pennam referens*, Plum. Fil. t. 82. which Linnæus confounds with his *P. ftruthionis*. Each lobe is furnifhed with a double row of fructifications, efpecially in the upper parts. The *covers* are femicircular. The loweft lobes of each frond are always more or lefs auricled on the lower fide at the bafe; fometimes they, and fome of the next, are deeply pinnatifid. 4. D. *contigua*, Hedw. Fil. fafc. 4. Sw. Fil. 130. (Trichomanes contiguum; Forft. Prod. 84.) Frond linear-lanceolate, pinnatifid; fegments linear, obtufe, fomewhat cut. Sw. A native of the iflands of the Pacific ocean, of which we have feen no fpecimens. 5. D. *pinnata*. Cav. Lecc. 277. Frond pinnate. Leaflets linear, alternate, crenate. Stalk triangular. Cav. Found by Louis Née in Chili, as well as in the Philippine iflands. The *ftalk* is triangular with a longitudinal furrow, reaching to the fummit of the plant. *Leaf* a foot long, compofed of alternate, undulated leaflets, fix inches long, and two lines broad, but narrower towards the point. Near every incifion are one or two globofe dots of fructification, each with a cup-like *cover*, which is not fo long as broad, and adheres to the leaf by its bafe and fides. Cav. 6. D. *falcata*. Sm. Tracts, 249. Sw. Fil. 13? Frond pinnate. Leaflets lanceolate, fomewhat fickle-fhaped, undulated, many-flowered, unequally heart-fhaped at the bafe. In the Linnæan Herbarium, but from what country is unknown. The *frond* is long and narrow. *Leaflets* very numerous, alternate, crowded, feffile, about an inch long, lanceolate, bluntifh, wavy, fomewhat curved upwards. *Dots* numerous, each with a femicircular flat *cover*. Plumier's tab. 63. feems to be a different plant, and probably an *afpidium*. 7. D. *pedata*. Sm. Tracts, 248. (Adiantum repens; Linn. Suppl. 446. Humata trifoliata; Cav. Lecc. 273. according to Swartz.) Frond with five angles, three-cleft and pinnatifid; the end of its fegments crowded with fructifications. A native of the Mauritius, and of the Ladrone iflands. *Root* long, creeping, and fcaly. *Fronds* on upright fcaly ftalks, two or three inches long, each frond with five unequal angles, and compofed of three, more or lefs diftinct, leaflets, which are thick, polifhed, ftriated beneath; the central one moft pinnatifid and acute. *Dots* fmall, crowded near the points of the lobes, and each with a rounded clofe cover. 8. D. *hirfuta*. Sw. Fil. 131. (Trichomanes hirfutum. Thunb. Jap. 339; but not of Linnæus.) Frond bipinnate, hairy. Leaflets confluent, lanceolate, fickle-fhaped, crenate on the upper edge. Sw. Grows in Japan. *Frond* with its ftalk clothed all over with very fhort denfe hairs; doubly pinnatifid, and a fpan long. *Leaflets* alternate, lanceolate, bluntifh, gradually fhorter upwards, pinnatifid; their lobes lanceolate, crenate. *Dots* folitary in each notch. Thunberg. 9. D. *adiantoides*. Sw. Fil. 131. (D. domingenfis; Spreng. Sw. Filix arborefcens adiantoides major; Plum. Fil. 7. t. 6.) Frond doubly compound. Leaflets lanceolate, pointed, pinnatifid, crenate. Dots round, almoft marginal, with a cup-fhaped cover. A native of Hifpaniola and Jamaica. A beautiful fern, whofe *leaflets* are fometimes varioufly pinnatifid, the lobes being occafionally rounded and fhort, as in Plumier's figure, and at other times elongated and acute, on the fame leaflet. The *dots* are numerous, fo near the edge as to approach the character of a *Dickfonia*, but their *cover* is truly folitary, fhort, broad, and very thin, feeming never to combine with any reflexed marginal cover. 10. D. *pilofiufcula*. Frond thrice compound, pointed. Leaflets ovate, blunt, decurrent, crenate, hairy. Dots fcattered, globofe. Cover crenate. Sm. MSS. Communicated by the late Mr. Chriftopher Smith from Honimoa and Amboyna. *Frond* large and fpreading, rough in every part with fhort tawny hairs, thrice compounded in an alternate order; the principal divifions taper-pointed; the ultimate ones ovate, blunt, crenate. *Dots* fparingly fcattered, at fome diftance from the edge of the leaves, fmall, yellowifh, globofe, each invefted with a turgid, membraneous, pale brown or yellowifh, cup-fhaped, crenate cover. 11. D. *elata*. Sw. Fil. 131. (Trichomanes elatum; Forft. Prod. 85. Wibelia elata; Bernhardi in Schrad. Journ. for 1801, 122. t. i. f. 2.) Frond thrice compound, pointed. Leaflets lanceolate, pinnatifid, cut, crowded, ftraight; their fegments with two teeth. Covers elliptic-oblong, fhorter than the teeth. Found in the South-Sea iflands. The *frond* is tall, repeatedly compounded, fmooth, its ultimate leaflets crowded, fmall, lanceolate, acute, many-ribbed, toothed; each tooth as it were cloven to lodge a dot of fructification, whofe cover is elliptic-oblong, entire, not reaching to the points of the teeth. 12. D. *folida*. Sw. Fil. 132. (D. procera; Hedw. Fil. fafc. 4. according to Swartz. Trichomanes folidum; Forft. Prod. 86.) Frond thrice compound, rhomboid. Leaflets ovate, auricled at the upper edge, notched. Dots ovate, not reaching to the notches. Covers abrupt. A native of the South-Sea iflands, and of New Holland near Port Jackfon. *Root* clothed with very foft, narrow, curling fcales. *Frond* near two feet high, fmooth, firm, not polifhed, alternately tripinnate, acute; its whole form, and chief divifions, fomewhat rhomboid. *Leaflets* much inclined to be dilated or auricled at their upper edge at the bafe: ultimate ones ovate or elliptical, bluntifh, ftrongly, but fimply, notched or toothed. *Dots* folitary in each tooth, not reaching to the edge, ovate or urn-fhaped, at length reddifh, each with a clofe *cover* of the fame form, abrupt, but in fome degree dilated and plaited at the extremity. Probably Rumphius's *Dryopteris arborea*, v. 6. t. 32. f. 1. may, as Dr. Swartz fufpects, be this plant; at leaft we know none more like it. 13. D. *elegans*. Sw. Fil. 132. (Trichomanes denticulatum; Houtt. N. h. v. 2. t. 100. f. 2. Sw.) Frond thrice compound, lax, taper-pointed. Leaflets lanceolate, cut, ferrated; each ferrature double-toothed, embracing a folitary round dot. Brought by the late fir G. L. Staunton from China. The *frond* has a lax and feemingly drooping habit, with a dark-green hue and polifhed furface. *Leaflets* and their fegments elongated; the latter lanceolate, decurrent, acute, ftriated, ferrated, each ferrature formed of two forceps-like connivent teeth, between which ftands the round *dot* of fructification, with a brown, orbicular, though fomewhat abrupt *cover*, reaching to the edge of the leaf betwixt the teeth. We have a *Davallia* gathered by the late Mr. Chriftopher Smith, on Barn ifland, in the ftraits of Sincapore, which feems a variety of this with lefs connivent teeth, and not quite fo lax a habit. Mr. Menzies alfo gathered one very like it, if not the fame, in Otaheite. 14. D. *patens*. Sw. Fil. 132. Frond thrice compound; its divifions nearly oppofite, fpreading. Leaflets lanceolate, pinnatifid; their fegments linear, tipped with fructification, which

which extends rather beyond their points. Mentioned by Swartz as a native of the East Indies. We have met with nothing that precisely answers to his description, though Mr. Menzies found in Otaheite a species which comes very near it. 15. D. *pyxidata.* Cav. Leccion. 278. Frond thrice compound. Leaflets stalked, somewhat rhomboid, pinnatifid, or cut; their lower lobes unequal; their margins notched. Dots marginal, each surmounted by a blunt tooth. A native of the isle of Luçon, and of New South Wales, near Port Jackson. *Root* creeping, long, and very scaly. *Stalks* two to six inches high, smooth. *Frond* firm and smooth, six to twelve inches long, and half as broad at the widest part. The first, second, and sometimes third subdivisions are alternate and stalked; the last elliptical, inclining to rhomboid, pinnatifid or cut, crenate, their lower lobes unequal in size. *Dots* solitary in each notch, reaching to its edge, but surmounted by its blunt incurved tooth. *Cover* reddish, somewhat urn-shaped and turgid; its margin rounded and wavy. 16. D. *caudata.* Cav. Leccion. 279. Frond twice or thrice compound, shining, taper-pointed. Leaflets stalked. Fructifications oblong. Cav. Discovered by Louis Née at the Philippine islands. Cavanilles, from whom alone we have any knowledge of this species, describes it as much larger than the last, shining, as well as smooth, on the upper surface, doubly and alternately pinnate. The primary divisions are eight inches long, two wide, with a terminal waved point, an inch and half long, scarcely a line broad. The subdivisions are from one and a half to four inches in length, lanceolate, pinnatifid; wedge-shaped at the base. About the margin of each segment are three or four *dots* of fructification, larger than in the preceding species. 17. D. *cuneiformis.* Sw. Fil. 133. (D. didyma; Hedw. Fil. fasc. 4. Trichomanes cuneiforme. Forst. Prod. 85; according to Swartz.) Frond thrice compound. Segments wedge-shaped, somewhat ovate, cut. Dots in pairs. Sw. Found in the South-Sea islands. 18. D. *setosa.* Frond thrice compound, all over hairy. Leaflets alternate, decurrent, oblong, sinuated. Dots solitary in each sinus, bristly. Sm. MSS. Found by Mr. A. Menzies in the Sandwich islands. The *frond* is perhaps two or three feet high, triply winged in an alternate order; the *leaflets* especially are very regularly alternate, decurrent, oblong, bluntish, sinuated so as to be almost pinnatifid. The *stalks* and whole *frond* are clothed with fine, bristly, or shaggy, pellucid, jointed hairs. *Dots* solitary near each sinus of the leaflets, round, brown, their *covers* concealed or clothed with numerous hairs like those of the frond. 19. D. *aculeata.* Sw. Fil. 134. (Adiantum aculeatum; Linn. Sp. Pl. 1559. Filix ramosa major, caule spinoso, foliis seu pinnulis rotundis profundè laciniatis, seu cerefolii foliis; Sloane Jam. v. 1. 99. t. 61.) Frond thrice compound. Leaflets wedge-shaped, lobed, obtuse, flat. Stalks zig-zag, with hooked prickles. Observed by Sloane, Swartz, and others, in Jamaica and Hispaniola. *Fronds* three or four feet high, triply winged, in an alternate order. *Stalks* slender, zig-zag, round, shining, beset with little, scattered, hooked prickles. *Leaflets* smooth, alternate, divaricated, wedge-shaped, cut into two or three obtuse, wedge-shaped lobes, at the extremity of each of which are lodged commonly two round *dots* of fructification, seemingly imbedded between the coats of the leaf, each with its own small *cover* distinct from those coats. 20. D. *dumosa.* Sw. Fil. 135. (Adiantum frutescens, spinosum et repens; Plum. Fil. 77. t. 94.) Fronds thrice compound. Leaflets wedge-shaped, lobed, abrupt; their extremities reflexed. Prickles of the stalks straight. Plumier, and long since his time Thierry, have gathered this fern in Hispaniola. Linnæus confounded it with the preceding; and indeed it is difficult to say which he intended by his *Adiantum aculeatum*, neither of them being in his Herbarium. As the former is the most common and best known, we follow Dr. Swartz in considering it as the original species. The present plant is said to creep to a great extent, not only along the ground, but over the trunks of trees, its *fronds* being very long, and so covered with spines that Plumier observes it looks more like a bramble than a fern. These spines are not only vastly more numerous, and larger, than those of the foregoing, but straight, not hooked, and the principal stalks at least are less zig-zag. *Leaflets* abrupt, not rounded at their extremities; and reflexed at the edge, not flat. *Dots* small, covered by the reflexed edge of the leaf. 21. D. *fumarioides.* Sw. Fil. 135. (Acrostichum aculeatum; Linn. Sp. Pl. 1530. Trichomanes aculeatum; Sw. Prod. 137. Davallia aculeata; Hedw. Fil. fasc. 4., according to Swartz.) Frond thrice compound. Leaflets wedge-shaped, deeply cut into linear segments. Dots solitary. Prickles of the stalks hooked. Dr. Swartz and the younger Hedwig have most happily determined the genus of this fern, which was altogether misplaced in *Acrostichum*, and which is closely related to the two last species. Linnæus very negligently quotes the same synonym of Sloane for this and his *Adiantum aculeatum*. Both are natives of Jamaica. The name *fumarioides*, though a jumble of Latin and Greek too usual among botanists, admirably expresses the habit of this delicate fern, whose foliage recalls the idea of our *Fumaria capreolata.* The deflexed hooks of the stalks distinguish it from the last, and more resemble D. *aculeata*, but the narrow, linear segments of the leaflets, with one *dot* of seed-vessels only near the point of each, make it evidently and sufficiently distinct from both. 22. D. *canariensis.* Sm. Tracts, 246. (Trichomanes canariense; Linn. Sp. Pl. 1562. Jacq. Ic. Rar. v. 1. 200. Polypodium lusitanicum; Linn. Sp. Pl. 1556.) Frond thrice compound, with three principal branches. Ultimate segments lanceolate. Dots solitary. A native of Portugal, the Canary islands, and the country about Algiers, where, as we are informed by M. Durand, it grows on the cork tree. It is frequent in our green-houses, being cultivated with little trouble in a pot, and almost always covered with fructification. The appearance of the thick rough bare roots has given it the name of hare's-foot fern. The evident absurdity of confounding this with the genus *Trichomanes*, both on account of its habit and character, first led the writer of this article to consider the genera of this tribe, and to attempt a new method of distinguishing them, by the cover of their fructification, which has since been universally adopted and carried by various writers to great perfection. The *fronds* of this species are about a foot high, almost as broad as long, being divided into three principal branches, and those twice or thrice pinnate; the ultimate segments are lanceolate, somewhat elliptical, entire, such as bear fruit dilated and cloven. *Dots* solitary, round, orange-coloured. *Cover* cup-shaped, more or less crenate. 23. D. *retusa.* Cav. Leccion. 278. Sw. Fil. 133. Frond thrice compound, broadest at the base. Branches tapering. Leaflets alternate, wedge-shaped, in two or three segments, abrupt. Dots in pairs or solitary. Cavanilles received this species from the island of Luçon. We have a specimen gathered by Mr. Menzies in the Sandwich islands, which agrees so exactly with his description that we have no doubt of its being the same. The *frond* is above three feet high, smooth in every part, its general outline oblong, pointed, broadest at the base, the first pair of *pinnæ* being the longest. *Stalk* and *branches* round; the latter obscurely bordered or winged. All the *pinnæ* and *leaflets* are alternate; the latter wedge-shaped, narrow, entire

tire at the fides, ftriated, tapering down into a flattifh ftalk; their termination very abrupt, deeply fplit into two or three lobes unequal in length, often with a minute point at each terminal angle. *Dots* one or two at the fummit of each lobe, fmall. *Cover* broad, fhort, wavy. 24. D. *microcarpa.* Frond thrice compound, lanceolate. Leaflets alternate, wedge-fhaped, in two or three fomewhat elliptical fegments, abrupt. Dots in pairs, or folitary, minute. Sent us by the late Mr. Chrift. Smith from Amboyna. The whole *frond* is rather fmaller than the laft, and lanceolate, the *pinnæ* about the middle part being the longeft; thefe, as well as the lower ones, are nearly oppofite; but this may be a variable circumftance. The fegments of the *leaflets* differ materially from the laft in being fomewhat elliptical, and rather contracted at the extremity, which ftrikes the eye at firft fight. The *dots*, conforming to this contraction, are very fmall and fhort. We cannot refer this to any fpecies defcribed by Swartz or Cavanilles, though it is unqueftionably allied to fome of the following. 25. D. *chinenfis.* Sm. Tracts, 247. Sw. Fil. 133. (D. ferruginea; Cav. Leccion, 277? Adiantum chufanum; Linn. Sp. Pl. 1558. A. tenuifolium. La Marck Encycl. v. 1. 44. A. nigrum chinenfe, tenuitèr divifum, pinnulis minimis obtufis plerumque bifidis; Pluk. Phyt. t. 4. f. 1. Trichomanes chinenfe; Linn. Sp. Pl. 1562. Ofb. It. 242. t. 6?) Frond thrice compound, lanceolate. Leaflets alternate, wedge-fhaped, in two or three fegments, abrupt, jagged. Dots in pairs, or folitary, roundifh. A native of China. *Root* tufted with a few branched fomewhat hairy fibres. *Stalk* fmooth, channelled in front with obtufe edges. *Frond* about a foot high, in texture and colour like D. *canarienfis*, but lanceolate as in the laft fpecies, alternately thrice-pinnate. *Leaflets* wedge-fhaped, cloven, or three-cleft, rather dilated than contracted at the extremity, which is externally jagged or toothed. *Dots* folitary, or in pairs, large, roundifh. *Cover* pale, wavy, cup-fhaped. Such is the original fpecimen which Linnæus appears to have defcribed twice over. The figure of Ofbeck reprefents the leaflets too much dilated and rounded, and yet it is difficult to fuppofe his plant different from that of Linnæus, who quotes him for the fpecimen he defcribed, which is intermediate in the form of its leaflets between the plates of Ofbecks and Plukenet. Cavanilles's defcription of his *Davallia ferruginea* fo well accords with our plant, that we cannot believe them to be different, and he himfelf prefumed either that or his *retufa* muft be the Linnæan *Trichomanes chinenfe.* We thus reduce three fpecies of Dr. Swartz to one. 26. D. *gibberofa.* Sw. Fil. 134. (D. glaucefcens; Hedw. Fil. Fafc. 4. Trichomanes gibberofum; Forft. Prod. 85.) Frond thrice compound, glaucous beneath. Segments of the leaflets linear, entire, gibbous, obtufe, bearing fructification at their inner margin. A native of the South-Sea iflands, known to us only by the fhort characters given by Forfter and Swartz. We fhould have fuppofed it a *Darea* but for the authority of the latter. 27. D. *epiphylla.* Sw. Fil. 134. (Trichomanes epiphyllum; Forft. Prod. 85.) Frond thrice compound, taper-pointed. Leaflets deeply ferrated and cut. Dots below the points of the fegments. A native of the South-Sea iflands, which we have adopted, like the laft, from Swartz and Forfter. The latter defcribes the fructifications as feated on the upper fide of the frond, which is contrary to all example, and, from the learned Swartz's filence, probably a miftake. 28. D. *glauca.* Cav. Leccion. 278. Sw. Fil. 134. Frond thrice compound, glaucous. Leaflets linear, pinnatifid, acute, alternate. Dots folitary, globofe. Gathered by Louis Née, in that part of the Andes called the *Cordillera del Planchon.* Cavanilles, from whom alone we have any knowledge of this fpecies, defcribes it as follows. "The plant, at firft fight, appears like the *Trichomanes tamarifciforme*, defcribed and figured by Jacquin, in the third volume of his Collectanea, 285. t. 21. f. 2. but is not very different from it. Our plant, without including the *ftalk*, which is fmooth, and marked with a longitudinal groove, is more than a foot high, by four inches in breadth. It is all over of a pale hue, and thrice pinnate, in an alternate order. The *leaflets* are linear, pinnatifid, from one to three lines long, with fharp taper points. Each of them bears, very near the edge, a folitary globofe *dot* of fructification like the point of a pin." 29. D. *clavata.* Sm. Tracts, 247. (Adiantum clavatum; Linn. Sp. Pl. 1559. A. minus, foliis in fummitate retufis; Plum. Fil. 75. t. 101. f. *b.*) Frond upright, alternately thrice compound. Leaflets linear, club-fhaped, ribbed. Dots folitary, terminal, broader than the barren part of the leaflet. A native of the Weft Indies. *Frond* about a foot high, with a long, fmooth, pale ftalk; divided into feveral alternate principal branches, each of which is once or twice, likewife alternately, pinnate. *Leaflets* alternate, undivided, half an inch long, ribbed, wedge-fhaped, but extremely narrow, except at the very fummit, where they are dilated to receive the *dots* of fructification, which are folitary, tranfverfely elliptical, with a toothed *cover.* The apex of the leaflet is alfo fimilarly toothed and abrupt. Linnæus, at one time, confounded this with a very different fern, his *Trichomanes capillaceum.* Plum. Fil. t. 99. f. D, but it does not appear that he has any where defcribed it as fuch. 30. D? *trifoliata.* Sw. Fil. 133. (Adiantum trifoliatum; Linn. Sp. Pl. 1558. A. triphyllum et retufum; Plum. Fil. 81. t. 99. f. B.) Frond pendulous, zig-zag, alternately twice compound. Leaflets ternate, linear-wedge-fhaped. Dots folitary, terminal. Plumier mentions this as growing in the clefts of trees, but in what particular ifland of the Weft Indies he does not fpecify. Swartz mentions Hifpaniola, yet the plant does not occur in his Prodromus. We prefume, therefore, he adopted it from Plumier, and that the latter only has feen it. He defcribes it as of a moft beautiful green, with very flender, black, creeping roots. *Stalks* black, flender, branched, zig-zag. *Leaflets* ternate from each flexure of the branches, four lines long, of a very narrow wedge-like form, blunt, the extremity "bent back fo as to cover a little collection of fine duft." Now, if this defcription be correct, and it is all we have to guide us, the plant is an *Adiantum* (fee ADIANTUM, fp. 21.); and yet Dr. Swartz fays, "it appears rather to belong to *Davallia* than to *Adiantum*," an obfervation to which we fhould pay the higheft deference, and fuppofe Plumier to be incorrect, if Dr. Swartz had feen this fpecies himfelf, which the mark of a crofs in his book implies he has not. We are, therefore, moft inclined to believe this plant ought to remain in *Adiantum*, and we have mentioned it here chiefly to excite the attention of travelling botanifts, and to preferve, as much as poffible, the knowledge of fo pretty and curious a vegetable production.

Dr. Swartz fufpects that *Trichomanes capillaceum* of Linnæus, Plum. Fil. t. 99. f. D, alfo *Adiantum trilobum.* Linn. Plum. ibid. f. C, and f. A. tenuitèr divifum, may all be *Davalliæ*, but we have not materials either to confirm or to refute this opinion. S.

DAVANA, in *Ancient Geography*, a town of Afia, in Mefopotamia, feated on a plain at fome diftance N.E. from the river Billicha.

DAVARA, the name of a hill of Afia Minor, towards mount Taurus. Tacitus.

DAUBA, in *Geography*, a town of Bohemia, in the circle

circle of Boleflaw; 16 miles W.N.W. of Jung-Buntzel.

DAUBE, a fmall town of Saxony, in the circle of Meiffen or Mifnia, remarkable for a quarry of good millftones, which are fent at great diftances by the Elbe.

DAUBENSEE, a lake of Germany, in the circle of Bavaria; 10 miles S. of Traunftein.—Alfo, a lake of Swifferland, on mount Gemmi.

DAUBING, in *Agriculture*, a term fignifying plaftering with clay, in the operations of ploughing, harrowing, &c.

DAUBY, a term applied to clayey land when wet, fignifying clammy, or fticky.

DAUBENTON, Lewis Mary, in *Biography*, doctor in medicine, member of the Royal Academy of Sciences at Paris, and of the Royal Societies of London and Berlin, was born at Montbard in Burgundy in 1716. Having taken his degree of doctor in medicine in 1740, he went to Paris, and his difpofition leading him particularly to the ftudy of comparative anatomy, he was, through the influence of his countryman, the celebrated M. De Buffon, made keeper of the royal cabinet of natural hiftory. In this fituation he was enabled to contribute very largely to the fplendid natural hiftory, firft publifhed by M. De Buffon, in 1749, and which has been feveral times reprinted: every thing relating to the anatomy both of men and animals in that work being furnifhed by Daubenton. In 1784, he publifhed at Paris, "Inftructions for Shepherds and Proprietors of Flocks;" and in the fame year "A methodical View of Minerals," with their diftinctive characters, according to a new arrangement which he had contrived; he alfo communicated to the Academy of Sciences "Obfervations on the Liquor contained in the Allantois of Animals," on fome "Teeth and Bones remarkable for their Size," and on the "Situation of the Foramen Magnum, in Men and in certain Animals." By good fortune, or by his prudence, he not only efcaped being maffacred during the revolution in France, but, in 1799, he was elected member of the confervative fenate. He died December, in the fame year, in the the 84th year of his age, and was honoured with a funeral oration by the naturalift, Lacepede. Haller Bib. Anat. General Biography.

DAUCHITÆ, in *Ancient Geography*, a people of interior Libya.

DAUCIONES, a people of Scandinavia.

DAUCUS, *in Botany*, Carrot, (Δαυκος; Diofc.) Linn. Gen. 131. Schreb. 182. Willd. Sp. Pl. v. 1. 1389. Juff. 224. Gærtn. t. 20. Clafs and order, *pentandria digynia*. Nat. Ord. *Umbelliferæ* or *Umbellatæ*.

Gen. Ch. *Umbel* compound; concave when in fruit. *Involucrum* of feveral pinnatifid leaves. *Cal.* fuperior, obfolete. *Cor.* Petals five, inverfely heart-fhaped, inflexed; the outer ones larger and radiant. *Stam.* Filaments five, capillary, fpreading; anthers roundifh. *Pift.* Germen inferior, fmall, elliptical, compreffed, rough; ftyles two, reflexed; ftigmas blunt. *Peric.* none. *Fruit* ovate, hifpid. *Seeds* two, elliptic-oblong. Central flowers of each umbel abortive.

Eff. Ch. Involucrum pinnatifid. Corolla fomewhat radiant. Fruit muricated. Central flowers abortive.

D. *Carota.* Common Carrot, Engl. Bot. t. 1174. Woodv. Med. Bot. t. 161. Mart. Ruft. t. 82. is biennial, frequent in a wild ftate about the borders of fields, and univerfally cultivated for its efculent root. The leaves are finely divided and fubdivided. Stem furrowed, hifpid, branched. Flowers white, numerous, the central one only in each umbel being of a more or lefs deep blood-red, and abortive. D. *Gingidium* is a large broader-leaved fpecies, found in the fouth of Europe, from which D. *lucidus*, Linn. Suppl. 179, proves not to be different. D. *Vifnaga* of Linnæus, ufed in Spain for tooth-picks, is rather a fpecies of *Ammi*. Several new fpecies of *Daucus* are announced in the Prodromus Fl. Græcæ by Dr. Smith, and others may be found in Desfontaines' Flora Atlantica.

Daucus, in *Gardening*, comprehends a plant of the tap rooted efculent kind; the common carrot (D. *Carota*).

Method of Culture.—In the culture of this ufeful vegetable, a deep light foil fhould be employed as much as poffible, and when of a fandy quality it is ftill more advantageous. It fhould have been well manured the preceding year, as when it is applied the fame year, the roots are apt to be affected with the canker. Where it is made ufe of the fame year, it fhould of courfe be well rotted, as fuch as has been ufed in the hot bed in forcing cucumbers, melons, &c.

In preparing the ground, it fhould be well trenched over, at no great length of time before the period of fowing, to the full depth of eighteen inches; the lumps being well broken and reduced, and the manure when ufed at the time completely turned in. When this bufinefs is not performed in a perfect manner, the roots are liable to fpread in a lateral direction, and become branched, and of but little value.

The fituation fhould be open, and free from the droppings of trees, or other inconveniences of the fame kind.

The feed for this crop fhould always be fuch as has been collected from plants of the preceding year, and which is perfectly frefh and well ripened: as old feed never anfwers well in this culture, much of it being in a ftate incapable of vegetating in a proper manner.

The forts moft proper for the different garden crops, are for the early ones the horn carrot; but for the general crop, the orange is conftantly to be employed, not only as growing more large, but more ftraight and handfome, and keeping better, as well as being more fweet and pleafant to the tafte, when dreffed for the table.

And the other varieties may be grown where variety is wanted. Whatever fort is made ufe of, it is of much confequence to have genuine feed.

As to the times of fowing this fort of crops, they muft vary according as they are wanted. When they are required in fucceffion, three or four different fowings fhould be made from January till the beginning of May; but for the principal crop, the fowings fhould always be performed about the latter end of January, or in the beginning of the following month. A fowing may likewife be made in Auguft, to ftand through the winter, for producing an early fpring crop; or early crops of this fort may be obtained by forcing them on hot-beds. The principal crop generally becomes ready for ufe about the beginning of June.

In the fowing of the feed, after the furface of the bed has been rendered perfectly fmooth and even by the rake, it fhould be diftributed in as even a manner as poffible over the whole, and then carefully raked in. As the feed is of a light and chaffy nature, a calm dry time fhould be chofen for the purpofe, to prevent its being blown in an irregular manner into heaps. It is alfo ufeful to rub and feparate the chaffy parts of the feed well before fowing, and fome think it an advantage to have fand or dry fine mould well mixed with it. It fhould be fown moderately thick, efpecially when the foil inclines to be heavy. In very light foils it is fometimes the practice to tread in the feed, to prevent its rifing in heaps, raking the furface over afterwards; but this fhould never be done where there is any degree of ftiffnefs in the land. The fowings are ufually performed

formed on beds of four or five feet in breadth; but they may be made on large plats, where it is neceffary to have a large fpace of them.

After the plants have attained three or four inches in growth, they fhould be thinned out from fix to eight inches diftance, in proportion to the fize that is wanted; and be kept perfectly free from weeds: this is performed by a fmall hoe with the greateft readinefs; but fome thin their plants out by the hand: the former is, however, the better method, as the earth is at the fame time ftirred about the roots of the plants. The work is beft done when the weather is dry. The crops fhould afterwards be occafionally looked over every fortnight or three weeks, to be further thinned when neceffary, and to keep the weeds from rifing in the ground.

Where thefe forts of roots are much wanted at an early period while young, it is better to fow a piece of ground for the purpofe, than to depend upon the thinnings of the general crops though thefe may often be thinned to advantage.

The crops which were put in, in Auguft for the following fpring produce, fhould be managed in the fame way; but it will be neceffary to protect the plants, in winter, when the weather is fevere, by coverings of fome light dry materials, fuch as litter, ftraw, &c. fo as to prevent their tops from being injured by the frofts.

Method of Culture on Hot-beds for early Ufe.—In this method of management, crops may be provided for early ufe, where thofe of the autumn have been injured or deftroyed by bad weather, or other caufes.

In this intention, the fowings fhould be made in the beginning of January and the following month, on hot-beds formed of dung, moulded eight or ten inches deep, and covered by frames and glaffes. In the growth of the plants, air muft be freely admitted, by having the glaffes removed, except in the night-time, and when the weather is fevere. When the plants are an inch or two in height, they muft be thinned out to the diftance of three or four inches, and be occafionally fupplied with water in a moderate proportion. When the heat of the beds declines much, linings fhould be had recourfe to as there may be occafion, in order to keep them in a proper ftate of growth.

By this management thefe roots may be provided a month or fix weeks fooner than in the other methods.

In order to preferve the roots of the main crops in the winter, they fhould be taken up about November, when the feafon is dry; and when fufficiently dried in the air, and cleared from earth, and their tops cut off clofe, be packed up in dry fand in a dry fhed, cellar, or other convenient place, being well covered on the top with ftraw. In this mode they may be preferved till March or April. If they are fuffered to remain in the ground, they are not only liable to be deftroyed by vermin, but to become cankery, and rotten, and of courfe much lofs is fuftained.

And to fave the feed of thefe plants, fome of the fineft roots fhould be planted out about February, in rows two feet apart, and one foot diftant from plant to plant. They will fhoot up to ftem in April or the following month, flower about June, and in Auguft the feed becomes ripe; then the tops fhould be cut off when dry, expofed in the fun, and after becoming perfectly dry, the feed thrafhed out, and put up into bags to be kept in a dry place for ufe. See CARROT.

DAUCUS CAROTA, in the *Materia Medica.* Carrots either boiled and mafhed to a pulp, or merely grated fine, form an excellent poultice to be applied, without the intervention of lint, to very foul ulcers particularly of the cancerous kind, which has a great and often truly furprifing effect in abating the intolerable pain, and correcting the fhocking fœtor that attends thefe dreadful diforders.

DAUDIE, in *Geography*, a town of Egypt; 16 miles N. of Afhmunein.

DAUE, or DAYE, in *Ancient Geography*, a town of Arabia. Steph. Byz.

D'AVELLA, GIOVANNI, in *Biography*, a friar who publifhed at Rome in 1657, a work in folio, entitled, "Regole di Mufica," in five treatifes, in which are promifed "true and eafy inftructions for canto fermo, canto figurato, counterpoint, finging, and many other new and curious things," by Giovanni d'Avella, a friar, Roma, 1657. The fplendid promifes in the title-page are, however, as ufual, very incompletely fulfilled. The book is full of prejudices in favour of old rules, with many that are peculiar to the author; which render what was before dark and difficult, ftill more unintelligible. From his ignorance of hiftory, and the mufic of the ancients, he advances innumerable abfurdities, giving the Guidonian hand not only to Boethius, but to Plato and Ariftotle; and tells us, that "St. Gregory ordered that no other gamut fhould be ufed in the church, than that of Guido," who lived 500 years after him.

The account of this worthlefs publication is given as a beacon to eager collectors of old and curious treatifes on mufic, in whom the title may increafe "the rage of appropriation."

DAVENANT, JOHN, an Englifh prelate of confiderable learning, in the feventeenth century, was the fon of a wealthy merchant, and born in London. He was admitted penfioner of Queen's college, Cambridge, in 1587. Here he took his degrees, and after the death of his father accepted a fellowfhip in the college. In 1609 he took his degree of doctor in divinity, and was fhortly after appointed lady Margaret's profeffor, and one of her preachers. In 1614 he was elected mafter of his college. He ranked fo highly among Englifh divines, that he was fent with others, by James I. in the year 1618, to the fynod of Dort, to fit and give their votes in that fynod. See DORT. Dr. Davenant returned from Holland in the fpring of the following year, and was in 1621 nominated bifhop of Salifbury. He continued high in court-favour during the remainder of James's reign; but in 1630-1, he incurred the difpleafure of Charles I. for maintaining the doctrine of predeftination, in a fermon preached before him at Whitehall. He was fummoned to anfwer for his conduct, and expreffed much contrition for the offence, declaring that he would at all future times conform himfelf, as readily as any other perfon, to the royal commands. By this conduct, which was truly difgraceful to a man of talents, he efcaped farther trouble, and was affured of a reconciliation, but was never afterwards admitted to court. He died of a confumption, April 20th, 1641. He was characterized by his contemporaries for hofpitality, kindnefs, and much meeknefs in his deportment. He publifhed many works, but the principal was, "A Latin Expofition of St. Paul's Epiftle to the Coloffians," in folio. This is the fubftance of lectures read by him as lady Margaret's profeffor. At the fynod of Dort, he inclined to the doctrine of univerfal redemption, maintaining the certainty of the falvation of a certain number of the elect, and that offers of pardon were fent not only to all that fhall repent and believe, but to all who heard the gofpel, and that all might, if they chofe, be faved. Dr. Davenant was buried in the cathedral at Salifbury. Biog. Brit.

DAVENANT, WILLIAM, a poet in the reigns of Charles I. and II. was the fon of a tavern-keeper at Oxford, in which city he was born in 1665. He ftudied at Lincoln college, but his ftay there was fhort, and his firft fituation in the

the world was page to the duchefs of Richmond: from hence he removed to the family of Greville lord Brooke, who would probably have become a zealous patron to the poet, had he not been deprived of life by the hand of an affaffin. Mr. Davenant had, however, made himfelf fufficiently known to bring out a play, "Albovine," in the following year, 1629, with great fuccefs. From that time he was admitted to the familiar acquaintance of the principal wits about court, among whom, for many years, he maintained a refpectable ftation. In 1637 he was elected poet-laureate, and his attachment to the king involved him in the troubles of that period. He was apprehended by the parliament for a ferious charge, but contrived to elude the vigilance of his keepers, and efcaped to France. On account of fome fervices done for the king, he was made a knight, in the year 1643. This honour was conferred at Gloucefter. He foon after went again to France, where he embraced the Roman Catholic religion. This procured him the confidence of the queen, who had fought a refuge there, and who fent Davenant to England, to perfuade the king to make his peace with parliament, by giving up the interefts of the church of England. He was unfuccefsful, and was feverely reprimanded by his fovereign. Upon his return to Paris, he began his heroic poem, entitled, "Gondibert;" but he foon quitted his retirement, and undertook the project of carrying out a colony from France to fettle in Virginia. The fhip, however, in which he embarked, was taken by an armed veffel belonging to the Parliament, and fir William Davenant was committed a clofe prifoner to Cowes caftle in the ifle of Wight. In this fituation he compofed a part of his "Gondibert;" but in October 1650 he was removed to London for trial by a high-commiffion court. He efcaped with his life, but was kept two years a prifoner in the tower. Upon his releafe from confinement, he had recourfe to a public exhibition of entertainments, as a mean of extricating himfelf from the indigence into which he had fallen. Thefe entertainments, which were at firft a mixture of declamation and mufic, led to the reftoration of dramatic pieces; and early in the following reign fir William Davenant was made patentee of the company which performed in Lincoln's Inn Fields. From this period he fpent his time in comfort and reputation. He continued to write plays till his death, which happened April 7, 1668. The complete works of fir William were publifhed by his widow in 1675, and dedicated to the duke of York, afterwards James II. Thefe, with the exception of "Gondibert," are now forgotton. This is an unfinifhed poem, entitled by the author an "heroic," though he meant to affimilate it to the epic poems of antiquity; but it differs from them in rejecting the interference of fupernatural agents, and making it a mere narration of human events, conducted by human characters. Sir William Davenant may be regarded as one of our firft lyric poets, as he furnifhed the court with more mafques, with incidental fongs and plays, during the reign of Charles II. than any other of our dramatic writers. Biog. Brit.

Davenant, Charles, the eldeft fon of fir William, was born in 1656. The firft part of his education he had at Cheam in Surry; but he finifhed his ftudies at Baliol college, Oxford. He fhewed an early inclination to dramatic compofition, and at the age of nineteen brought a tragedy on the ftage, entitled, "Circe," which was much approved. He very fhortly after this turned his attention to the civil law, in which he obtained a doctor's degree from the univerfity of Cambridge. He had now attained to a fufficient degree of confequence to be returned a member of parliament for St. Ives in 1685, and about the fame time was joined in a commiffion with the mafter of the revels for the infpection of the pieces to be brought on the ftage. He obtained other pofts of emolument in king James's reign, but it was not till after the revolution that he commenced political writer, and called the attention of the public to many interefting pieces on the trade and revenues of the country. In the following reign he was appointed to the poft of infpector-general of the exports and imports, the duties of which office he performed with diligence and accuracy. He died Nov. 6th, 1714. His works are numerous: they were collected and publifhed in five volumes 8vo. in the year 1771, by fir Charles Whitworth, to which is annexed a copious index. "Dr. Davenant," fays fir John Sinclair, "is certainly a moft valuable political author, and, confidering that the modern fyftem of politics, founded on a fpirit of commerce, on public credit, on paper circulation, and on fkill in finance, was then, in a manner, in its infancy, he undoubtedly was a writer whofe progrefs was more advanced than could have been expected at that time. It appears from his works that he had accefs to official information, from which he derived many advantages. He feems, however, to have depended too much upon political arithmetic, or the ftrength of figures, which ought only to be reforted to when the fact itfelf cannot be afcertained, being only a fuccedaneum, when better evidence cannot be procured. He was, unfortunately, alfo a party writer, and faw every thing in the manner the beft calculated to promote the views and purpofes of his political friends at the time. Every thing they did was right, while every action of their enemies was ill-intended and ruinous. He poffeffed a very confiderable command of language, and is fometimes too prolix; but, on the whole, there are certainly very few that can rival him as a political author." Biog. Brit.

DAVENTRY, in *Geography*, is a market-town in the hundred of Farofley, and county of Northampton, England, feventy-three miles N.W. from London, containing, according to the returns under the late act of Parliament, 503 houfes, and 2582 inhabitants. It is an ancient town, ftanding in an angle between the rivers Nen and Avon, which induced Mr. Pennant to derive the name from *Dwy avon tref, i. e. the town of two rivers;* thus making it of British origin; and from the Roman encampment called *Burrow-hill*, in the vicinity, the conjecture is highly probable. It is an incorporated borough, though it has not the privilege of fending members to parliament. The corporation confifts of a bailiff, twelve burgeffes, a recorder, town-clerk, two head-wardens, and twenty common-council men. The bailiff, while in office, and the following year, acts as a juftice of the peace, and coroner of inquefts. Of the corporation the bailiff, ex-bailiff, with the recorder, conftitute a quorum, and can attach for all debts under the fum of one hundred pounds; and in criminal cafes commit the accufed to the county gaols. The quarterly-feffions are held for the parifh as a diftinct diftrict. The charter was granted in the reign of king John, and confirmed by queen Elizabeth. The manor, in the time of Edward the third, was granted to the celebrated John of Gaunt, and annexed to the duchy of Lancafter. Some veftiges of his palace ftill remain near Daventry park, and are called Burnt-walls. A large building, now occupied by poor people, was once a priory, which was founded about the year 1090, by Hugh de Leycefter, for monks of the Cluniac order. This was one of the monafteries which led to the general downfall of monachifm in England. It was diffolved by the permiffion of pope Clement VII. in the feventeenth year of king Henry VIII; and granted to cardinal Wolfey, towards the erection of his new colleges in Oxford aud Ipfwich; but, as Stow fays, "with fatal fuccefs to the principal actors." The revenues were valued at the

diſſolution at 236*l.* Out of this ſum, granted to Chriſt-church, Oxford, a perpetual curacy was endowed, which is always held by a ſtudent of that college. A free-ſchool was founded here in 1576 by William Parker. The learned John Wilkins, biſhop of Cheſter, author of "An Univerſal Language," and other valuable works, was born at this place in 1614.

Daventry has a large weekly market on Wedneſdays, and four annual fairs, *viz.* on Eaſter-Monday, June the 6th, Auguſt the 3d, October the 2d, and the 27th. A little to the eaſt of the town is an ancient encampment, called Burrow-hill. It is diſpoſed in an oval ſhape, and extends about three quarters of a mile in length, by one quarter in breadth. It is defended on one ſide by a double foſs and vallum, and in ſome places by three, four, and five. On the ſouth-eaſt ſide of the hill is another encampment, which contains about an acre of land, and is ſurrounded by a ſingle foſs and vallum. Though theſe works are evidently Roman, Mr. Pennant refers them to the Britons; and both he and Mr. Gale agree to fix here the Benavenna of the Itinerary. Bridge's Hiſtory of Northamptonſhire. Pennant's Journey from Cheſter to London.

DAUGHTERS, among the *Ancients*, were more frequently expoſed than ſons, as requiring greater charge to educate and ſettle them in the world. See Exposing *of Children.* Thoſe who had no legitimate ſons were obliged, by the Athenian laws, to leave their eſtates to their daughters, who were confined to marry their neareſt relations, otherwiſe to forfeit their inheritance; as we find to have been practiſed likewiſe among the Jews, many of whoſe laws ſeem to have been tranſcribed by Solon.

If an heireſs happened to be married before her father's death, this did not hinder the neareſt relation to claim the inheritance, and even to take the woman from her huſband; which is ſaid to have been a common caſe. Potter, Archæol. Græc. lib. iv. c. 15. tom ii. p. 441. See Son.

The ſons and daughters of the king of England are called the ſons and daughters of England; becauſe all the ſubjects of England have a ſpecial intereſt in them. See Prince.

DAUHN, or Daun, in *Geography*, a ſmall town of France, in the department of the Sarre, chief place of a canton in the diſtrict of Prum, 33 miles W. of Coblentz. It has but 320 inhabitants, and the canton in 41 communes reckons only a population of 4790 individuals.—Alſo, a town of Germany, in the circle of the Upper Rhine, called Thaun; 12 miles S. of Simmern.

DAVIANUM, in *Ancient Geography, Veine*, a town of Gaul, in the province called "Secunda Narbonnenſis." It was between Seleucus to the ſouth-weſt, and Vapincum towards the north-eaſt.

DAVID, in *Biography*, king of the Jews, in many reſpects an illuſtrious character of ancient times, was the youngeſt ſon of Jeſſe, of the tribe of Judah, and was born about 1085 years before Chriſt. When Saul by his miſconduct had forfeited the crown to which he had been elected, David, who had hitherto attended principally to the buſineſs of a paſtoral life, was ſingled out by providence to ſucceed him. But we muſt trace him in the early parts of his life. He was pointed out by Samuel as heir to the throne, long before he actually took upon him the duties of government; and we are informed that he was inſpired with thoſe qualities of body and mind, that prepared him for the delicate and difficult ſcenes through which he would be called to paſs. When Saul was ſinking into a ſtate of deſpondency brought on by his vice, and by diſobedience to the divine command, David, who was a proficient in muſic, was ſent for to ſoothe the anguiſh of his wounded mind by the ſounds of his harp. By the wiſdom and prudence of his conduct he gained the king's favour, and was made his armour-bearer; כלי נשא, bearer of the inſtruments or weapons, of which there were different ſorts, *viz.* the ſhield, the target and ſpear, bucklers and ſwords. David's being armour-bearer to Saul, implies no more than that he was conſtituted one of his guards. What particular duties attached to this office it would be difficult to aſcertain; they were, however, of ſo eaſy a nature as not to preclude him from attending again to his father's domeſtic concerns. A war breaking out between the Iſraelites and Philiſtines, in which, previouſly to the deciſive engagement that was expected, the champion Goliah challenged the braveſt of his foes to ſingle combat, David was allowed to accept the challenge, and Saul would have clothed him in his own armour, but he choſe to make uſe of no other weapons than his ſtaff and ſling, in the uſe of which, like the ſhepherds of his times, he was exceedingly expert. Thus accoutred he brought the proud Goliah to the ground by a ſtone which he threw from his ſling, and he inſtantly cut off his head and preſented it to Saul. The defeat of the Philiſtines was the conſequence of the death of their leader. This exploit recommended David ſo much to the king, that he reſolved to keep him near his own perſon, appointed him to many poſts of honour, and determined upon giving him his eldeſt daughter, after he had made ſome further trial of his prudence and valour. In this ſituation he acquired the friendſhip of Jonathan, Saul's eldeſt ſon, and much eſteem among the people. (1 Sam. xviii.) Saul began to be jealous of the reputation and influence which David had among all ranks of people; and at length jealouſy degenerated into fear and hatred. He reſolved to deſtroy him, and deviſed many methods for this purpoſe, but David eluded them all. The particular circumſtance that ſerved to excite the invincible jealouſy of Saul, and to induce his determination to deſtroy him, was the following: The Philiſtines had encamped in the territories of the tribe of Judah, not far from Jeruſalem; where Saul ſeems to have continued ſome time after the rout of their army, and where David received the firſt tokens of his favour. But as Saul was returning to his own city, accompanied by David, the women came out of all the cities of Iſrael, through which they paſſed, ſinging and dancing, to meet the king, with tabrets and other inſtruments of muſic to expreſs their joy; and ſinging alternately, one chorus chanted "Saul hath ſlain his thouſands;" and the other replied, "David hath ſlain his ten thouſands." This, though probably innocently intended, filled Saul with indignation and rage; and the preference thus given to David ſeems to have excited the firſt ſuſpicion, that David was the man deſignated by Samuel, when he aſſured him, that "the kingdom ſhould be given to a neighbour of his that was better than himſelf;" for Saul ſaid in his rage, "they have aſcribed to David ten thouſands, and to me they have aſcribed but thouſands; and what can he have more but the kingdom?" From this time to the very end of his life, Saul looked on David with a malignant eye, and watched every opportunity to deſtroy him. Of this he ſoon gave David two very convincing proofs; for the very next day after theſe acclamations of the women, Saul fell into one of his mad fits of melancholy, and, as we render the words, "propheſied in the midſt of the houſe," or, as the learned Dr. Chandler tranſlates the expreſſion for critical reaſons, which he aſſigns, "howled and grumbled" in his frenzy; and as David was playing, without the leaſt ſuſpicion of danger, to divert his melancholy, Saul in an inſtant threw at him a javelin, which he had in his hand, with a reſolution to ſtrike him dead to the wall. David happily eſcaped this danger, and ran out of the room; and upon his entering it a ſecond time, Saul

threw a dagger at him, which he alfo avoided, and immediately withdrew from the king's prefence. This double deliverance alarmed Saul, and he was more than ever afraid and fufpicious of David, becaufe he faw that he was under the peculiar protection of God, whilft he found himfelf deftitute of his direction and favour. For this reafon he removed David from immediate attendance upon him, and gave him a regiment, which he well difciplined, and headed on every occafion where its fervice was neceffary. In this command he behaved with fuch remarkable prudence and circumfpection, as that Saul could find no reafon for complaint, which, though it heightened Saul's diftruft of, and malice againft him, yet fecured him the efteem of all Ifrael and Judah; becaufe they found him a good commander, and fuccefsful in all the expeditions in which he employed his troops.

Saul, being thus difappointed by David's cautious and gallant behaviour, fent for him, and treacheroufly propofed to give his elder daughter Merab to be his wife; hoping, that by venturing on fome dangerous expedition againft the Philiftines, in order the more effectually to merit the king's daughter, he would be fome time or other cut off in an engagement by their hands. David received the propofal with humility and gratitude; but Saul broke his promife, and otherwife difpofed of his daughter. However, he gave him his fecond daughter, Michal, with a view "that fhe might be a fnare to him." The condition ftipulated on the part of Saul was, "100 fore-fkins of the Philiftines." David accepted the offer, and, before the expiration of the time that had been fixed, produced double the number required. The Hebrews were in a perpetual ftate of war with the Philiftines during the whole reign of Saul: and the only juft reafons that could vindicate Saul in commanding, and David in executing his command, to cut off 100 Philiftines, were either God's order, or their being at war with the Philiftines, or the neceffity of it to weaken their enemies, or the fafety of their country, the fecurity of their liberties, or fuch like motives; and if thefe motives concurred to juftify David in accepting the condition of becoming Saul's fon-in-law, by bringing the hundred forefkins, his cutting off more of them was a yet higher fervice to the public; and fo far from being any breach of the rules of religion or morality, was a proof of real patriotifm and public fpirit; highly merited the thanks of his king and country, and rendered him more worthy of the honour intended him;—his alliance with Saul by the marriage of his daughter. David, therefore, notwithftanding what has been faid by Bayle, and other writers of inferior note, to the contrary, might ftill be "the man after God's own heart," and approving himfelf fuch in this very inftance; for though "God is unalterable," and always requires that we fhould "do juftly and love mercy;" yet it does not appear that God hath any where fixed the exact number of enemies to be killed in an expedition; nor does he require that a general fhould fpare an implacable enemy, invading his country, deftroying the inhabitants of it, and determined to fubvert the religion and liberties of it, when he hath an opportunity of deftroying him, and when fuch deftruction becomes neceffary to the prefervation and fafety of the public. In the cafe before us, David, by the deftruction of thefe Philiftines, does not feem to have acted contrary to the rules of religion and morality, if war, in felf-defence, be in any inftance allowable; for the men he deftroyed were the enemies of his country, in a ftate of actual war with his prince and people; and, therefore, lawful prize wherever he could lay hold of them, and in every expedition in which he was employed to harafs and deftroy them.

David married Michal, who affectionately loved him, and Saul obferved with regret and vexation, that God protected him; and thus his apprehenfions and dread of David were increafed, and his hatred and malice towards him rendered ftill more and more implacable. Soon after this, the Philiftines renewed their hoftilities againft the Hebrews. David was in the action, and his prudence and bravery became fo remarkable, that he was deemed fuperior to all the commanders of Saul, and highly efteemed for his military abilities and conduct. Whilft David was gathering frefh laurels in a fuccefsful expedition againft the Philiftines, Saul fell into a frefh frenzy of jealoufy and rage; and, as David was playing upon his harp, according to his ufual practice, for the kind purpofe of diverting his melancholy, Saul threw a javelin with fuch force at him, which, happily miffing him, ftuck faft into the wall of the room where he was fitting. David immediately fled, and retreated to his own houfe. Saul purfued him, and appointed his guards to watch him, and to prevent his efcape; but by the artifice and affiftance of his wife, he was refcued from this danger, and got fafe to Samuel at Ramah. As foon as Saul had heard of the place of his retreat, he difpatched, at three feveral times, meffengers to apprehend him; but they were deprived, in an extraordinary manner, of the difpofition and power to feize him. Saul himfelf haftened to Ramah, with the purpofe of apprehending David; but his refolution was in a fingular manner counteracted and over-ruled; and he himfelf delivered, as it were, into the power of Samuel, and David efcaped unhurt. This incident in his hiftory affords a noble evidence of the innocence and loyalty of Samuel and of David; and at the fame time a pleafing inftance to a generous compaffionate mind, of the care of Providence over perfecuted virtue, and of the impotence of human malice towards thofe whom God is determined to preferve. David availed himfelf of the opportunity that now offered itfelf of making his efcape to Jonathan, and of engaging his interference with Saul in his favour, in which bufinefs he acted the part of a faithful friend; and in fo doing, incurred the refentment of his father. Upon taking his leave of Jonathan, David went to Nob, a city belonging to the priefts, in his way to the Philiftines, amongft whom he intended to take refuge from the perfecutions of Saul. Having at this place recovered Goliah's fword, he haftened to Achifh, king of Gath; whofe hoftile defigns he counteracted, by feigning himfelf mad. It has been faid, by thofe who have calumniated the character of David, that he intended to enter into a treaty of alliance with this Philiftine prince againft the Hebrews; but this charge is contradicted by the attendant circumftances; for, as he fled to Achifh, under the apprehenfion of being affaffinated by the machinations of Saul, it is plain that he never manifefted any defign of engaging with him againft his king and country, becaufe he was taken up as a fpy, and then difmiffed as a madman. Being ordered immediately to leave the dominions of Achifh, he made the beft of his way out of the territories of the Philiftines; and, in acknowledgment of his happy deliverance, he penned the 34th pfalm. Upon his coming from Gath to the tribe of Judah, he retired to the cave of Adullam; where he was joined by his brethren, and by many others who were in diftrefs, or in debt, or difcontented; and feveral other perfons of known reputation and valour. (1 Sam. xxii. 1, 2.) In this fituation he was grievoufly diftreffed with thirft; and in order to procure water for him, three of his worthies broke through the hoft of the Philiftines then encamped at Bethlehem, and brought it to David; but fuch were his felf-denial and forbearance, that he declined drinking it, becaufe it had been obtained for him at the hazard of the lives of his friends. The cave

of

of Adullam has been reprefented by thofe who have been difpofed to cenfure David's conduct, as a place of rendezvous for his followers, and he has been charged with rebellion againft Saul. But thofe who reforted thither did it freely, and without folicitation on his part; nor does it appear that David took the advantage of this circumftance for depriving Saul either of his life or crown. In this refpect, Mr. Bayle himfelf has been conftrained to do him juftice. On this occafion, David acted folely upon the principle of felf-prefervation and defence; he never oppofed or difturbed the quiet of Saul's government; he never folicited the tribes to join him during his life, or excited a fpirit of difcontent and rebellion, or popular commotions againft him; he never entered into any confpiracy to dethrone him; never attacked his army; never by force levied contributions upon his fubjects to fupport him; never joined the enemies of his country to invade it; never difputed any of his reafonable commands, but ferved him faithfully whilft he employed him; never deferted him, or provided himfelf with guards, till forced to it by the unrelenting jealoufy and rage of his unhappy perfecutor; never took any advantage that occurred for feizing his perfon, or deftroying him; but in his whole conduct, behaved with all the fubmiffion that became him as a dutiful fon-in-law to his father, and a good fubject to his prince. As a faithful fubject, he had a natural right to protection, and to fecure himfelf from the violence of a tyrant, by any juft and prudent meafures within his power. His own repeated and folemn proteftations of innocence ought alfo to be admitted in his favour, more efpecially when they are confirmed and juftified by the teftimony of Jonathan, and that of Saul himfelf, after his life was fpared in the cave of Engedi. (1 Sam. xxiv. 17, 18, 19. See alfo ch. xxvi. 18. 21. 25.) From the cave and ftrong hold of Adullam, David removed to the foreft of Hareth, where he penned the admirable hymn recorded in the 63d pfalm.

Soon after the barbarous outrage committed by Saul upon the priefts at Nob, under the charge of Doeg, for having harboured David, he was informed that the Philiftines were befieging Keilah, a city in the tribe of Judah; and having inquired of the Lord, whether he fhould go and fmite them, and obtaining an anfwer in the affirmative, he went thither with his men, fought with the Philiftines, brought away their cattle, fmote them with a great flaughter, and thus faved the city and its inhabitants. This brave and gallant action merits the higheft commendation. "It was," as Grotius (in loc.) juftly obferves, "an inftance of his great love to his country, who, though profcribed as a rebel by the king, was fo far from injuring his country, as that he ferved it at the coft of his enemies." So far was David from making any attempt to keep poffeffion of Keilah, that when Saul was coming againft the city on his account, and with a view of feizing him as his prey, he departed to the wildernefs of Ziph, where he concealed himfelf in the natural fortreffes of the rocks and mountains of that defert. Saul purfued him with a defign of taking away his life; but he was preferved from falling into his hands. Saul, however, was called off from the purfuit by the news of a frefh invafion of his territories by the Philiftines. Whilft David was in the wildernefs with his guards, he lay near the eftate of Nabal, who had fheep and goats in abundance. Inftead of fuffering his men to pilfer or forcibly to take away any part of Nabal's property, he refpectfully entreated fuch a fupply as his circumftances required. Nabal returned a churlifh and abufive meffage (1 Sam. xxiv.); fuch as was likely to excite the juft refentment of David. Abigail, however, the wife of Nabal, interpofed, and by her temper and prudence, difarmed David of his anger, and prevented the retaliation which he was meditating. In ten days after this event Nabal fickened and died, and Abigail fometime after became David's wife. The intercourfe on this occafion between David and Abigail was carried on in the moft open and public manner, in the prefence of David's men and Abigail's fervants, in the field where they met; and it was begun and concluded without interruption, or any private conference between them, as appears by the whole feries of the hiftory, that could give them the leaft opportunity for any criminal intercourfe. If we duly confider the feveral circumftances recited in this hiftory, although David's paffion and oath to deftroy Nabal and his family are by no means to be vindicated; though the refolution was cruel, and the oath a rafh and wicked one; yet it muft be allowed that the provocation given him was of the higheft nature, aggravated with the moft outrageous circumftances, and fuch as no military man could help grievoufly refenting. What man of honour and generofity, what foldier at the head of his troops, what fon-in-law of a king, and heir to his throne, would have tamely borne all this vile indignity, and unmerited calumny and abufe? Would any partifan, in our modern armies, put up with an affront and injury like this, and not retaliate it with a feverity equal to what David threatened? However, he was happily prevented from avenging himfelf according to his intention, by being brought to a juft fenfe of the rafhnefs and cruelty of his purpofe, and not by any methods of wickednefs and villainy; and nothing can be more unreafonable than the fufpicion of Abigail's proftituting herfelf to David; fince the two expreffions, that may have given rife to it, are not poffibly capable of any fuch interpretation. The firft, "Upon me let this iniquity be," is a form of fpeech frequently ufed in deprecating a punifhment which another deferves, by transferring, as it were, the crime and punifhment upon the perfon who pleads for the criminal. (2 Kings xiv. 9. Pf. lv. 3. If. liii. 6.) It argues a corrupt mind to pervert it to a criminal meaning; and it is obvioufly, and by the faireft interpretation, no more than if fhe had faid, "Rather let me fuffer than him." As to the other expreffion, "I have accepted thy perfon," (fee Gen. xxix. 21. Job xlii. 9. If. iii. 3. Prov. xviii. 5.) its meaning is; "I have accepted thy interpofition for Nabal, and for thy fake will not execute my intended revenge upon him."

After David had honourably difmiffed Nabal's wife and fervants, he concealed himfelf in the hill Hachilah, before Jefhimon, whither he was purfued by Saul with 3000 chofen men. David, accompanied by Abifhai, vifited the camp of Saul in the dead of the night, and found him with Abner, and all the people round about him, faft afleep. Abifhai was eager to difpatch his enemy, but David repreffed his ardour, and manifefted on the occafion the moft glorious moderation and fortitude of mind. (1 Sam. xxvi.) Was ever refolution more generous and loyal? One ftroke would have fixed his mortal enemy dead on the fpot, put an end to all his fears, and mounted him to a throne. And yet this hypocrite, this diffembler, this rebel, traitor, bloody ambitious parricide, for thefe are the titles with which he hath been decorated, immediately ftarts back at the propofal of it, and the profpect of a crown will not tempt him to a bafe, difloyal, and impious action to obtain it. David merely ordered Abifhai to take away the fpear at the bolfter of Saul, and the cruife of water that ftood by him, and to carry them off, as the proofs of Saul's danger, and of his own fidelity to him. The whole paffage recording this part of the hiftory of David and Saul, if it had been found any where but in the Bible, would have been read with pleafure, and pointed out as worthy of admiration, for the many excellencies that

that are contained in it. Notwithſtanding Saul's promiſe to David at Ziph that he would do him no more harm, yet knowing his implacable temper, and apprehending, that the ſpirit of jealouſy and rage would return on him, David lived in a ſtate of perpetual anxiety. He therefore retired with his followers to Achiſh, king of Gath, who gave him, his family and companions, a very friendly reception, and aſſigned to him the town of Ziklag, as a permanent property for himſelf and followers. Here David was joined by ſeveral mighty men of valour, who accompanied him in his invaſion of the Geſhurites, Gezrites, and Amalekites. David's conduct on this occaſion has been ſeverely cenſured, and alſo miſrepreſented by Bayle. In mitigation of the ſeverity exerciſed by David, it has been ſaid, that the Amalekites were the ancient enemies of the Jewiſh nation, doomed, many ages before this, to deſtruction by the God of Iſrael. David, therefore, might have pleaded a divine command for exterminating the reſtleſs and inveterate enemies of his country. After the expedition now mentioned was terminated, David returns to Achiſh, and upon being aſked where he made his incurſion? David anſwers, "Againſt the ſouth of Judah, &c." which reply Mr. Bayle charges with falſhood, calling it, not very liberally, "a lie." But the anſwer was literally true, but ambiguous; for all thoſe people dwelt on the ſouth of Judah, &c. David was now in a critical ſituation; and the greateſt and beſt caſuiſts have allowed, that ambiguous anſwers are not always criminal, but ſometimes juſtifiable, eſpecially in ſuch a ſituation. (See Grotius de J. B. et P. l. iii. c. 1. §. 10, and Gronovius's note on the paſſage, paragr. 1. note 74.) Of this ſentiment were Socrates, Plato, Xenophon, Cicero, the Stoics, Ariſtotle, Quinctilian and others mentioned by Grotius, (lib. v. c. 1. §. 9, page 3 and 4.)

David, having been afterwards preſſed into the Philiſtine camp and ſervice by Achiſh, was reduced to the greateſt ſtraits, and ſcarcely knew how to conduct himſelf, conſiſtently with the confidence which that prince placed in him, the duty which he owed to his country, and his own intereſt and views, as an expectant of the crown and kingdom of Iſrael. But Providence happily extricated him from this embarraſſment (1 Sam. xxix. 1, &c.); for as the troops of the Philiſtines were paſſing in review before their principal officers, David alſo with his corps marched in the rear, under the command of Achiſh, king of Gath. This circumſtance offended the Philiſtines, and their princes were peremptorily determined not to permit David and his forces to accompany them to the engagement, ſo that Achiſh was induced to diſmiſs David and his followers. On his return to Ziklag, he attacked the Amalekites, and recovered all that they had taken away, their wives and families, and entire ſubſtance; and at Ziklag, he diſtributed his ſhare of the ſpoil partly to thoſe of the elders of Judah, who were his friends, and partly among the inhabitants of thoſe towns, which had given refuge to himſelf and his men, during the time of their perſecution by Saul; and by this act manifeſted his prudence, gratitude, and juſtice.

David now reſided among the Philiſtines, in whoſe country theſe Amelekites had committed great depredations, whilſt the Philiſtines themſelves were engaged in war with the Hebrews, and incapable of defending their own frontiers. He was their ally, obliged to act in their favour, and behaved like a ſoldier of honour, in avenging the injuries that had been done them: and we may obſerve upon the whole, that David's execution of vengeance on the Amalekites for their treacherous invaſion and unprovoked acts of violence, whilſt neither the Philiſtines nor the Hebrews could defend their territories, was a deſerved and neceſſary ſeverity. There are other circumſtances and conſiderations, ſuggeſted by the hiſtory to any impartial and candid reader, which amply vindicate David's expedition againſt the Amalekites. In this expedition he evinced his reſolution and courage, and his zeal in promoting the welfare of his country, though he was in a ſtate of actual baniſhment from it, and forced to ſeek for ſhelter in the dominions of an enemy. He was further enabled to ſecure, and ingratiate himſelf with his former friends, the elders of Judah, by the preſent which he reſpectfully ſent them; and theſe were fortunate circumſtances, as they happened juſt before the death of Saul, who, with his three ſons, were killed in battle againſt the Philiſtines, upon the mountains of Gilboa.

On the third day after David's return to Ziklag (2 Sam. i. 1.) from the ſlaughter of the Amalekites, he was informed by an Amalekite of the death of Saul and his ſons, owning himſelf to be the perſon who killed him, and preſenting David with his crown and bracelet. This wretch intended thus to ingratiate himſelf with David; but he knew not his diſpoſition, and that a crown would be unwelcome to him at the price of treaſon, and that a throne would not tempt him, if it were to be purchaſed by parricide. Could he, who himſelf thrice ſpared Saul's life, when he found it abſolutely in his power, endure the man that boaſted of having murthered him? On this occaſion he behaved with that dignity and juſtice that ſet him above all deſerved reproach, however his conduct may have been unjuſtly criminated.

Upon the death of Saul and his three ſons, David having been ordered by the oracle to go up to Hebron, the capital city of the tribe of Judah, was unanimouſly choſen and anointed king over their whole tribe. It was natural for this tribe to ſeize the opportunity of Saul's death, and to acknowledge him, whom God had pointed out to them for their king; eſpecially as he was of their own tribe, and had gained the general eſteem by his perſonal virtues, and military abilities. This tribe might further have been induced to raiſe David to the throne over them, becauſe they hoped that the ancient prophecy of Jacob (Gen. xlix. 10.) was now about to be accompliſhed. This tribe was alſo the moſt powerful and reſpectable of all the twelve; and as they had a right to chuſe their own prince, they might reaſonably have expected that the other tribes would have followed their example, and, by uniting in David, quietly have ſubmitted to the appointment of God, as they themſelves had done. David was now 30 years old (B. C. 1055); and having, on many occaſions, ſhewn his courage, fortitude, moderation, and patience, and having maintained an invincible purpoſe not to haſten his acceſſion to the throne by any acts of treaſon and violence, God now began to reward his ſingular virtue; and, from a fugitive and exile, he was made king over all the tribes, by their unſolicited and voluntary conſent; as an earneſt of what God had in farther reſerve for him;—the kingdom over all his people. Iſhboſheth, a younger ſon of Saul, was a competitor with David for the ſovereignty. It is acknowledged, that David had no pretenſion to the throne by right of inheritance, and in this reſpect Saul had no more right than David, nor Iſhboſheth than either of them; the hereditary right, if any ſuch right exiſted, being veſted in Mephiboſheth, Saul's grandſon, by his eldeſt ſon Jonathan. Iſhboſheth was the mere creature of Abner, the captain of Saul's hoſt, who, ambitious of retaining the power in his own hands, made Iſhboſheth king over Iſrael by military force; without the choice or conſent of the eleven tribes, and in direct oppoſition to the choice and conſent of the tribe of Judah, and the inclination of the whole body of the people. Iſhboſheth was, therefore, in every reſpect, an uſurper, in prejudice of the right heir; and

and David, as well as every man in Ifrael, had a right to oppofe him, and prevent his eftablifhment in the kingdom. The right of David to the crown was indifputable, and the higheft by which any man could claim it. Upon the death of Saul, the throne was vacated, and the people were at full liberty, under the direction of God, to chufe whom they pleafed. The tribe of Judah, as we have faid, unanimoufly elected David for their king and it is highly probable, that the whole body of the nation would have concurred, if they had not not been prevented by the influence of Abner. A civil war was the confequence of thefe rival interefts, which lafted above feven years under the influence and fupport of Abner, with the eleven tribes; but when Abner perceived that his caufe declined, and that of David profpered, he availed himfelf of an opportunity that occurred of bringing about a revolution in favour of David. The eafy method by which Abner effected this revolution, and the cordial manner in which the whole nation fubmitted to David, are a demonftration that they approved Abner's change, and were glad to accept David for their king. For no fooner had Abner a conference with the elders of Ifrael, and put them in mind that they had formerly defired David for their king, and that the Lord had refolved to deliver them from the Philiftines, and their enemies, by the inftrumentality of David, than all the tribes came to Hebron, all the men of war, "with a perfect heart," and all Ifrael, "with one heart to make him king;" and accordingly anointed him king over Ifrael. In this whole affair David's conduct appears to be perfectly honourable. Joab, however, refented David's acceptance of Abner's fubmiffion, and having infulted his perfon, took leave of him, with a refolution of deftroying Abner.

In purfuance of this refolution, Joab, jealous of Abner, and dreading his being fuperfeded in the command of the army by the advancement of a rival, took the opportunity of a friendly conference treacheroufly to affaffinate him. In this bafe and bloody act David had no concern; fo far from it, that he expreffed, in the ftrongeft terms, his deteftation of the bafe act. (2 Sam. iii. 28, 29.) As foon as Ifhbofheth was informed of Abner's death, he defpaired of his caufe, and gave up all for loft. The conteft, however, foon terminated in his death; for he fell a facrifice to the interefted and ambitious views of two brothers, who were captains in his guards, and who hoped, by the murder of their mafter, to recommend themfelves to David, and to obtain preferment in his fervice. David, in juft abhorrence of this act of treafon, ordered the perpetrators of it to be immediately executed; and as an expreffion of refpect for the memory of Ifhbofheth, he ordered his head to be buried in the fepulchre of Abner in the city of Hebron. Upon the death of Ifhbofheth, all the elders of Ifrael came to David at Hebron, prefented to him the conditions on which they advanced him to the throne, which being mutually and folemnly agreed to, they anointed him king, "according to the word of the Lord, by Samuel," many years before: thus fettling the government upon a folid foundation, and effectually providing for the national fecurity and peace. On this occafion, the hiftorian obferves (1 Chron. xii. 40.), "There was joy in Ifrael."

The firft act of his reign was the fiege and fubfequent capture of Jerufalem from the Jebufites, together with the fortrefs of Sion, to which he gave the name of the city of David, (2 Sam. v. 11.) whither he transferred the feat of government, and where he built a royal palace, making it the metropolis of the kingdom of Ifrael. On the completion of the palace, in which he was affifted by the Tyrians, who were better fkilled in architecture than the Hebrews, he penned the ode which we have in the 30th pfalm at the dedication of it. David, finding himfelf well eftablifhed on the throne, and fettled in his new-built palace, refolved to regulate his family and court. The fcheme he formed for this purpofe, and the regulations he adopted, are tranfmitted to us in an ode, (Pf. ci.) which will do honour to his memory, as a good man, and an excellent king, throughout all generations. Befides attending to his own perfonal convenience, he fet about enlarging and beautifying Jerufalem, and committed the care of this public work to Joab. When his public undertakings were finifhed, which muft have been feveral years in carrying on, he penned the 87th pfalm.

His increafing profperity excited the jealoufy of neighbouring nations, the ancient enemies of Ifrael; fo that foon after his eftablifhment on the throne, he was obliged to concert meafures for refifting them. Of thefe enemies the Philiftines took the lead, and kept him employed in repeated conflicts, which terminated on his part in renewed victories. As foon as he obtained reft, by peace at home and freedom from all foreign wars, he devoted himfelf to the bufinefs of making fome neceffary regulations in religion, and of providing for the more ftated performance of the folemnities of divine worfhip. With this view he transferred the ark to mount Sion at Jerufalem. The proceffion for this purpofe was accompanied with vocal as well as inftrumental mufic; and David prepared an ode, (Pf. lxviii.) to be fung by the chanters, the feveral parts of which were fuited to the feveral divifions of the march, and the whole of it adapted to fo facred and joyful a folemnity. A circumftance occurred as the ark had juft arrived at the city of David, or mount Sion, which has occafioned fome fevere cenfures by Mr. Bayle and others: this was his dancing before the ark. But thefe cenfures betray a total ignorance of David's manner of dancing, and the poftures he made ufe of, which ought to have been known before he could juftly be charged with having made himfelf ridiculous by them; becaufe perfons may dance in a very brifk and lively manner, without any poftures that fhall deferve contempt; and moreover there is no word in the original, that is made ufe of to exprefs David's behaviour in this proceffion, that either implies, or will juftify fuch a fuppofition. David was frequently, during his fubfequent reign, engaged in wars with the Philiftines, the Moabites, the Syrians, the Edomites or Idumæans, and the Ammonites, in which he often obtained the moft fplendid victories, and by which he was raifed very high in the eftimation of the monarchs of the eaft. In one inftance, that has been recorded by the facred writers without palliation, David's conduct cannot be too feverely condemned: he gave himfelf up to the fway of uncontrouled paffions; he ruined an innocent woman, and to complete the wickednefs of the deed, attempted to add murder to the crime of adultery. This was the affair of Bathfheba and Uriah. Much has been faid in order to aggravate David's guilt on this occafion; but we owe it to juftice and candour duly to confider, whether there be not, by way of contraft, any circumftances of alleviation in this tranfaction. A good mind will derive great fatisfaction from being able to extenuate guilt, where it can be fairly done, which, as far as it is real, ought never to be concealed or defended. David, at the commencement of this tranfaction, feems not to have incurred the charge of deliberation and fettled purpofe. Bathfheba was unknown to him, nor was he apprized that fhe was a married woman, when he firft cafually faw her. Much as he was to be blamed, his fin, in the firft inftance, had not that aggravation which it would have had, if there had been more time and leifure for reflection, and if he had purfued his criminal inclination, after having ferioufly and calmly weighed

weighed the nature and confequences of what he was about to do, and ufed, as too many others have done in like cafes, fraud, perfidy, and force to gratify them. Bathfheba herfelf feems to have too eafily yielded to the king's inclination, and thereby rendered it almoft impoffible for him to fupprefs it. Her compliance feems to have been voluntary, unforced, and immediate. The firft crime being committed, and the dreaded confequences of it appearing, the unhappy prince found himfelf involved in difficulties out of which he knew not how to extricate himfelf. Confcious guilt, concern for his own character, regard for the honour of the partner of his crime, and even fear of his own and her life, the punifhment of their adultery being death; all united to put him on forming fome contrivance, how to conceal and prevent the fcandal of it from becoming public. But all thefe failed him. Bathfheba at any rate muft be preferved. His own honour was at ftake to prevent her deftruction; and he faw but one way left to fecure that end, which he thought himfelf obliged, at any hazard, to obtain. If Uriah lived, fhe muft inevitably die. She muft have died, fays Jofephus, (Ant. l. vii. c. 7. §. 1.) as an adulterefs by the laws of her country. Uriah could have demanded the punifhment. The law was exprefs and peremptory. Which of the two muft be the victim? Cruel dilemma! It is at laft determined, that the hufband fhould be facrificed to fave the wife, whom David's paffion had made a criminal; and if he had abandoned her to her fate, he would have been cenfured by almoft every man, as a monfter of perfidy, bafenefs, and ingratitude. But how was Uriah to be got rid of? Poifon, affaffination, or a falfe charge of treafon, or fome fecret way of deftruction, were methods with which the eaftern princes were well acquainted. David was above them all, and had a kind of generofity even in his crimes. The man he was to deftroy was a brave foldier, and he caufes him to fall in the bed of honour, glorioufly fighting againft the enemies of his king and country. David's conduct is indeed incapable of vindication, but the circumftances that have been mentioned afford, in the nature of them, fome alleviation of his crimes, and foften the feverity of the hiftorian who defcribes them. David having thus, by accumulated guilt, taken off the man that he dreaded fhould live, took Bathfheba to his palace, and made her his wife, to fkreen her from a profecution of adultery, to fecure her againft the penalty of death, and in fome meafure to repair the injury he had done her; which, as a plurality of wives was not forbidden by that conftitution and polity under which he lived, was the leaft compenfation that he could make, and which he was obliged in juftice and honour to make her. One would have thought, without adverting to the obduracy of guilt, that, after fuch a complication of aggravated crimes, David, upon a review of his conduct, would have been ftruck with remorfe, confeffed his fins to God, and earneftly fupplicated forgivenefs. But the contrary appears from the hiftory to have been the cafe. He was for a confiderable time infenfible and callous, fo that Nathan the prophet was employed, by an artfully compofed fable, to induce the king to pronounce his own condemnation, even without fufpecting, or intending it. Bathfheba had been juft delivered of a fon, the fruit of her adulterous commerce with David, and who was, in the ftrictnefs of the letter, "conceived" by his mother "in fin, and fhapen in iniquity." David appears to have been fond of the child, and, in the midft of his joy on this account, Nathan demands an audience, and executes his commiffion. The dreadful fentence he pronounced roufed the confcience of David, and from the fulleft conviction of his offence, he immediately made this acknowledgment to Nathan, "I have finned againft the Lord." The pfalms he penned on this occafion fhew his deep fenfe of the guilt he had contracted, and will be a memorial of the fincerity of his repentance throughout all generations.

Vices of fuch enormity as thofe of David rarely pafs unpunifhed. David met in after-life with much affliction of the fevereft kind, which he would naturally impute to the hand of an avenging God for his paft offences. Abfalom his fon rebelled againft him, and was ftabbed to the heart with three darts by Joab, whilft he was fufpended in the midft of a tree; contrary to the pofitive orders of David, who was much incenfed by this act of treafon and murder; and at the fame time he was deferted by many of his moft efteemed friends. Thefe and other circumftances excited in the monarch the moft lively emotions of grief, which are pathetically referred to in the facred writings. The latter period of David's life was difturbed by an attempt of Adonijah to feize the crown, which, however, he effectually repelled, by caufing Solomon to be confecrated and proclaimed king during his own life.

David, having fettled Solomon's fucceffion to the throne, gave him a particular charge in reference to two ftate criminals, *viz.* Joab and Shimei. With regard to Joab, David mentions three murders, as the ground of the charge (1 Kings ii. 5, 6.) not to let him die a natural death. They were thofe of Abfalom, Abner, and Amafa; and the order refpecting Joab, according to every principle of equity and juftice, was worthy of a good king, and fit to be given in the laft moments of his life. It has been faid, indeed, that David was culpable for deferring to put Joab to death fo long, and entailing the performance of this retributive act of juftice on his fon and fucceffor. Joab, it fhould be recollected, was too powerful a fubject for David to bring to juftice. He attempted it twice by difplacing him from the office of general. But he reftored himfelf to his command by murder and treafon, in fpite of David, who feized the very firft opportunity, after Joab's power was broken, of ordering his execution. It fhould be confidered farther, that whatever Joab's paft fervices had been to David, and however faithful he had formerly been to him, yet he had now been engaged in a treafonable confpiracy againft him, to fet afide the intended fucceffion to the crown, and had actually proclaimed Adonijah king of Ifrael, during his father's life; altogether without, and even contrary to his confent. The order refpecting Shimei the Benjamite was founded on his having railed at and curfed David, pelting him with ftones, and crying out to him, "Come out, come out, thou bloody man, and thou man of Belial, &c." (2 Sam. xvi. 5—9.) This charge againft David as a bloody man, becaufe the blood of the houfe of Saul was upon him, was a fcandalous falfehood, and uttered in the madnefs of the paffion and malice of a man, who, being of Saul's houfe and family, was enraged to fee that family rejected from the throne, and David advanced to it in their ftead. David very properly reminded his fucceffor, that Shimei was an implacable enemy to his perfon and family, one who was not to be trufted, and would not fail to fhow his hatred when a proper opportunity occurred. David's direction to Solomon may be underftood to mean, that he fhould not put Shimei to death for having curfed him, becaufe he had forgiven him upon oath; but at the fame time he fhould not hold him guiltlefs; leaving it to Solomon's wifdom to inflict a proper punifhment upon him, provided it was not a capital one. It is certain that Solomon did not underftand his father as ordering Shimei to be put to death; but only that he fhould keep a watchful eye over him, and prevent him from all feditious practices for the future. Accordingly he ordered him to build a houfe for himfelf

ſelf at Jeruſalem, where he confined him, that he might be perpetually under his inſpection, and bound him never to go farther out of it than the brook Kidron; telling him, that "whenever he paſſed it, he ſhould ſurely die." Shimei himſelf, ſenſible of Solomon's great kindneſs to him, approved the ſentence pronounced upon him, and therefore the charge that David gave him, promiſing him, upon oath, obedience to the condition, on which his life was afterwards to depend.

David died at Jeruſalem in about the 70th year of his age, B. C. 1015, having reigned over Judah 40, and over all Iſrael 33 years. Although his character was far from being faultleſs, he had unqueſtionably many excellent qualities: he is deſcribed in the ſcriptures as "a man after God's own heart;" a phraſe which referred to the qualifications that he poſſeſſed, for carrying into effect the deſigns of Providence, and to his ſteady zeal in the worſhip of the living God, in oppoſition to the idolatry of ſurrounding nations, with which the Iſraelites had been but too often infected. "The man after God's own heart" ſtands in direct oppoſition to the character of Saul, who is deſcribed as acting fooliſhly, by breaking the commandment of God by his prophet, and rejected by him, *i. e.* deprived of the ſucceſſion to the crown in his family, on account of his folly, preſumption, and diſobedience. And it therefore means one, who ſhould act prudently, and obey the commandments of God delivered to him by his prophets, and whom, therefore, God would *thus far* approve and continue to favour. Thus the expreſſion is actually interpreted by the Chaldee paraphraſe; גבר עביד רעותיה, the man who doth my will; and by St. Paul to the Jews at Antioch, who ſays (Acts xiii. 22.) "I have found David, the ſon of Jeſſe, a man after my own heart," *who ſhall execute my will.* There are, therefore, two ſenſes which are evidently implied in this character of "the man after God's own heart;" a man, who ſhould faithfully execute the will of God, according as he was commanded, and who, on that account, and ſo far, ſhould be the object of his approbation. In one or other, or both of theſe ſenſes, the expreſſion is always uſed. David, therefore, is characterized as "a man after God's own heart;" not to denote the utmoſt height of purity in his moral character, as a private man, which by no means enters into the meaning of the expreſſion, and which in no one ſingle inſtance is intended by it; but to repreſent him as one, who, in his public character, as king of Iſrael, was fit for the purpoſes to which God advanced him, and who he knew would faithfully execute the commands he ſhould give him, by his prophets; and who, on this account, ſhould be favoured and approved of God, and eſtabliſhed, himſelf and family, on the throne of Iſrael.

The particular purpoſes for which God advanced him to the throne were, that by his ſteady adherence to the one true God, and the religion which he was pleaſed to eſtabliſh by Moſes, he might be an illuſtrious example to all his poſterity that ſhould reign after him; and here he was abſolutely without blemiſh, and "a man," in the ſtricteſt ſenſe of the expreſſion, "after God's own heart;" as he never departed from his God, by introducing the deities of other nations, or permitting and encouraging the impious rites which they performed in honour of them. There was another end of providence, in David's appointment to be king over Iſrael; that, according to God's promiſe concerning him (2 Sam. iii. 10.) he might "ſave his people Iſrael out of the hands of the Philiſtines, and out of the hand of all their enemies;" and farther, that by him he might accompliſh the more ancient promiſes (Gen. xv. 18.) which God had made to Abraham, in their full extent, of giving to his ſeed "the whole country, from the river of Egypt unto the great river, the river Euphrates." And finally, God raiſed him up to exalt the glory of his people Iſrael, and to render them a flouriſhing and happy people, by the wiſdom and juſtice of his government. (Pſ. lxxviii. 71, 72.)

"See here, then, the true portrait of "the man after God's own heart," who fulfilled all his pleaſure! A prince, who, amidſt all the idolatries of the nations around him, never wickedly apoſtatized from the worſhip of his God, and was an amiable example of a ſteady adherence to thoſe forms of religion, which God had preſcribed, to all the princes his ſucceſſors; who, though king, ſubjected himſelf to God, the ſupreme king of Iſrael, and faithfully executed the commands he received from him; who made his people triumph in the numerous victories he obtained, by the directions, and under the conduct of God himſelf; who enlarged their dominions, and put them into poſſeſſion of all the territories God had promiſed to their forefathers; and who, amidſt all the ſucceſſes that were granted him, the immenſe riches he had gathered from the ſpoils of his conquered enemies, and the ſovereign power with which he was inveſted, never degenerated into deſpotiſm and tyranny, never oppreſſed his people; but governed them with integrity, ruled over them with moderation and prudence, impartially diſtributed juſtice, left an eſtabliſhed durable peace, and fixed the whole adminiſtration, both civil and religious, upon the moſt ſubſtantial and durable foundation. In theſe inſtances he was the true vicegerent of God, on whoſe throne he ſat, and all whoſe pleaſure, in theſe great inſtances, he faithfully performed. If therefore David's private moral character was worſe than it will be ever proved to be, he might be ſtill "a man after God's own heart," in the proper original ſenſe of the expreſſion; and the attempt to prove that he was not poſſeſſed of the height of moral purity, is an impertinent attempt to prove David not to be, what the ſacred hiſtory never aſſerted him to be."

As a juſt delineation of the character of David, and of the principal events of his life, is of great importance in its connection with a due regard to the ſacred writings, and with religion, we have extended it to a conſiderable length; and we ſhall cloſe it with the following abſtract of his hiſtory, with which we are furniſhed by a learned writer: A ſhepherd youth, David, the youngeſt ſon of Jeſſe, was choſen of God to be king of Iſrael, and at his command anointed to this dignity by the hands of Samuel, a venerable prophet, in the room of Saul; who had been rejected for his diſobedience to the divine orders, in feloniouſly ſeizing to his own uſe, the prey of an enemy, which God, the ſupreme king of Iſrael, had devoted to deſtruction. He is introduced to court as a man expert in muſic, a mighty valiant man, a man of war, prudent in matters, a comely perſon, and one favoured of the Lord. By his ſkill in muſic, he relieved Saul under a melancholy indiſpoſition that had ſeized him, was highly beloved by his royal maſter, and made one of his guards. In a war with the Philiſtines he accepted the challenge of a gigantic champion, who defied the armies of Iſrael, and being ſkilful at the ſling, he ſlew him with a ſtone, returned ſafely with his head, and thus ſecured to his prince an eaſy victory over his country's enemies. The reputation he gained, by this glorious action, raiſed an incurable jealouſy and reſentment againſt him, in the mind of the king his maſter; who, after two unſucceſsful attempts to murther him, married him to his younger daughter, that ſhe might be a ſnare to him, and that he might cauſe him to fall by the hands of the Philiſtines;

times; fending him upon an expedition againft them, to bring in an hundred of their forefkins, in which he hoped he would have met with his own deftruction. In this exalted ftation, and amidft the dangers that encompaffed him, he behaved with fingular prudence, fo that he was in high efteem both in the court and camp. The modefty and prudence of his behaviour, and his approved courage and refolution, gained him the confidence and friendfhip of Jonathan, the king's eldeft fon, "who loved him as his own foul," became his advocate with his father, and obtained from him a promife, confirmed by an oath, that he would no more attempt to deftroy him. But his jealoufy returned by a frefh victory David gained over the Philiftines; who, finding the king was determined to have his life, retired from court, and was difmiffed in peace by Jonathan, after a folemn renewal of their friendfhip, to provide for his own fafety. In this ftate of banifhment, there reforted to him companies of men, who were uneafy in their circumftances, oppreffed by their creditors, or difcontented with Saul's tyrannical government, to the number of fix hundred men, to protect him from the violence of his unreafonable perfecutor; whom he kept in the moft excellent order, exercifed in the moft friendly fervices, and by whofe valour, he gained fignal advantages for his country; but never employed them in oppofition to, or rebellion againft the king, or in a fingle inftance to diftrefs or fubvert his government. Such was the veneration he paid him, and fo facred the regard he had for his life, fuch the generofity of his temper, that though it was thrice in his power to have him cut off, he glorioufly fpared him, and was abfolutely determined never to deftroy him, whom God had conftituted the king of Ifrael. His friendfhip with Jonathan, the king's fon, was a friendfhip of ftrict honour, whom he never feduced from his allegiance and filial duty; in him Jonathan had fo firm a confidence, that as he knew he would be king, he promifed himfelf he fhould be the next perfon in dignity and authority under him; and with his friend David covenanted by oath, that "he would not cut off his kindnefs from his houfe for ever." Being provoked by a churlifh farmer, who evil treated and abufed his meffengers, he, in the warmth of his temper, fwore he would deftroy him and his family; but was immediately pacified by the addrefs and prudence of a wife, of whom the wretch was unworthy; her he fent in peace and honour to her family, and bleffed for her advice, and keeping him from avenging himfelf with his own hand. Being forced to banifh himfelf into an enemy's country, he was faithful to the prince who protected him; and, at the fame time, mindful of the intereft of his own nation, he cut off many of thofe, who had haraffed and plundered his fellow-fubjects. When preffed by the king, into whofe dominions he retired, to join in a war againft his own country, and father-in-law, he prudently gave him fuch an anfwer as his fituation required; neither promifing the aid demanded of him, nor tying up his hands from ferving his own prince, and the army that fought under him; only affuring him in general, that he had never done any thing that could give him juft reafon to think he would refufe to affift him againft his enemies. Upon the death of Saul, he cut off the Amalekite who came to make a merit of having flain him; and by the immediate direction of God, who had promifed him the fucceffion, went up to Hebron, where, on a free election, he was anointed king over the houfe of Judah; and after about a feven year's conteft, he was unanimoufly chofen king by all the tribes of Ifrael, "according to the word of the Lord by Samuel," upon the death of Ifhbofheth, who was treacheroufly murthered by two of his own captains; whom David juftly cut off for their perfidy, treafon, and parricide.

As king of Ifrael, he adminiftered juftice and judgment to all his people, was a prince of courage, and great military prudence and conduct; had frequent wars with the neighbouring nations, to which he was generally forced by their invading his dominions, and plundering his fubjects; againft them he never loft a battle; he never befieged a city without taking it, nor, as for any thing that can be proved, ufed any feverities againft thofe he conquered, beyond what the law of arms allowed, his own fafety required, or the cruelties of his enemies rendered juft, by way of retaliation; enriching his people by the fpoils he took, and providing large ftores of every thing neceffary for the magnificent temple he intended to erect, in honour of the God of Ifrael. Having refcued Jerufalem out of the hands of the Jebufites, he made it the capital of his kingdom, and the place of his refidence; and being willing to honour it with the prefence of the ark of God, he brought it to Jerufalem in triumph, and diverting himfelf of his royal robes, out of reverence to God, he clothed himfelf in the habit of his minifters, and with them expreffed his joy by dancing and mufic; contemned only by one haughty woman; whom, as a juft punifhment of her infolence, he feems ever to have feparated from his bed. Though his crimes were heinous, and highly aggravated, in the affair of Uriah and Bathfheba, he patiently endured reproof, humbly fubmitted to the punifhment appointed him, atoned for his fins, as far as he could, by a fincere repentance, and obtained mercy and forgivenefs from God, though not without fome fevere marks of his difpleafure, for the grievous offences he had been guilty of. A rebellion is raifed againft him by his fon Abfalom, whofe life he commanded the general to fpare. When forced by it to depart from Jerufalem, he prevented the juft punifhment of a wretch who curfed and ftoned him. When reftored to his throne, he fpared him upon his fubmiffion, and would not permit a fingle man to be put to death in Ifrael upon account of it. He, with a noble confidence, made the commander of the rebel forces general of his own army, in the room of Joab, whom he intended to call to an account for murder and treafon. After this, when obliged, by the command of God, to give up fome of Saul's family to juftice, for the murder of the Gibeonites, he fpared Mephibofheth, Micah, and his family, the male defcendants of Saul and Jonathan, who alone could have any pretence to difpute the crown with him, and furrendered only Saul's baftard children, and thofe of his daughter by Adriel, who had no right or poffible claim to the throne, and could never give him any uneafinefs in the poffeffion of it; and thus fhewed his inviolable regard for his oaths, his tendernefs to Saul, and the warmth of his gratitude and friendfhip to Jonathan. In the clofe of his life, and in the near profpect of death, to demonftrate his love of juftice, he charges Solomon to punifh with death Joab, for the bafe murder of two great men, whom he affaffinated under the pretence of peace and friendfhip; and to manifeft his care of his fucceffor's fafety, and prevent any difturbances in the beginning of his government, he charges him to have an eye on the conduct of an old turbulent rebel, and, except cutting him off, to deal with him according to his prudence, and not to fpare him if he found any thing in him worthy of death. And as if one thing more was wanting to complete the catalogue of his noble actions, he profeffed the greateft regard for every appearance of virtue and holinefs, and gave the moft fhining and indifputable proofs of an undiffembled reverence for, and fincere piety to God; ever obeying

obeying the direction of his prophets, worſhipping him alone throughout the whole of his life, and making the wiſeſt ſettlement to perpetuate the worſhip of the ſame God, throughout all ſucceeding generations.

And as to his pſalms, they breathe the genuine diſpoſition of piety; they are wrote with a true ſpirit of poetry; the ſentiments to be found in them are often the moſt grand and ſublime, which have nothing in pagan poetry to exceed, or equal them; and which, had they been wrote on any other ſubjects but thoſe of religion, would have been regarded as the proofs of a moſt excellent genius; and his admirers would have wondered at the calmneſs and ſedateneſs of his temper, who, amidſt the multiplicity of his affairs, the variety of the perſecutions he ſuffered, the imminent dangers that ſurrounded him, and the numerous wars he was engaged in, could find any leiſure hours, or tranquil diſpoſitions, for the polite and delicate entertainments of poetry and muſic.

Theſe, Chriſtians, are the out-lines of a Jewiſh prince, whom you juſtly extol as "a man after God's own heart;" whom God himſelf called to be king over Iſrael, who faithfully anſwered the purpoſes for which God raiſed him; in whoſe family he eſtabliſhed the throne; with whom he made an everlaſting covenant; and who was the great progenitor of the Meſſiah himſelf, who now reigns over all, and "ſhall reign till all his enemies are put under his feet." Chandler's Critical Hiſtory of the Life of David, 2 vols. 8vo. paſſim.

The holy and royal pſalmiſt ſeems to have owed his riſe in a great meaſure to his muſical talents. He was firſt noticed and ſent for to Saul when troubled with the evil ſpirit, as Farinelli was to the king of Spain, to try the medical power of muſic. "And it came to paſs, when the evil ſpirit from God was upon Saul, that David took an harp and played with his hand; ſo Saul was refreſhed, and was well, and the evil ſpirit departed from him." 1 Sam. chap. xvii. v. 23. This was previous to the proof of David's prowefs in ſlaying Goliah, at which time, however, Saul did not recognize him as the muſician, who had put to flight the evil ſpirit; but inquired who he was?

If it be poſſible for muſic to operate medicinally with ſucceſs, it may be imagined a palliative, at leaſt, if not a cure, for a troubled ſpirit. The human mind, under the preſſure of affliction, or warped and agitated by the contention of warring paſſions, ſeems a fit ſubject for ſoft and ſoothing ſtrains to work upon, as powerful anodynes.

Without having recourſe to a miracle in the caſe of Saul, who had offended the Divinity by his diſobedience, the whole of David's power over the diſorder of that unfortunate prince, might be attributed to his ſkilful and affecting manner of performing upon the harp.

"And Saul's ſervants ſaid unto him, Behold now, an evil ſpirit from God troubleth thee. Let our lord command now thy ſervants which are before thee, to ſeek out a man who is a cunning player on a harp. And it ſhall come to paſs when the evil ſpirit from God is upon thee, that he ſhall play with his hand, and thou ſhalt be well. And Saul ſaid unto his ſervants, Provide me now a man that can play well, and bring him to me. Then anſwered one of the ſervants, and ſaid, Behold, I have ſeen a ſon of Jeſſe the Bethlehemite, that is cunning in playing, and a mighty valiant man, and a man of war; and prudent in matters, and a comely perſon, and the Lord is with him."

"Wherefore Saul ſent meſſengers unto Jeſſe, and ſaid, Send me David thy ſon, which is with the ſheep. And Jeſſe took an aſs, laden with bread, and a bottle of wine, and a kid, and ſent them by David his ſon unto Saul. And David came to Saul, and ſtood before him. And he loved him greatly, and he became his armour-bearer. And Saul ſent to Jeſſe, ſaying, Let David, I pray thee, ſtand before me; for he hath found favour in my ſight. And it came to paſs, when the evil ſpirit from God was upon Saul, that David took an harp, and played with his hand: ſo Saul was refreſhed, and was well, and the evil ſpirit departed from him."

It was very natural for the power of this medicine to ceaſe, when the patient had no more faith in him who adminiſtered it; but, on the contrary, regarded him with a jealous eye, as one aſpiring at his crown; and who, if he did not conſpire againſt his life, muſt look upon it as an impediment to his exaltation, and impatiently wiſh for its termination: for Saul not to have had theſe ideas forced upon his mind, he muſt have been more, or leſs, than mortal. The human paſſions, thoſe gales of life, muſt either have been annihilated, or ſublimed by angelic refinement. But the hiſtory of this prince furniſhes too many inſtances of human weakneſs and frailty, to allow us to ſuppoſe him either inſenſible, or ſuperior to his ſituation. We muſt therefore ſuppoſe his diſeaſe now to have become too powerful for ſo gentle a remedy as muſic. Nor ought we to imagine that a diſeaſe, or "an evil ſpirit from the Lord, with which he was troubled," was intended to be radically cured by human means, though it had at firſt given way to them.

Soon after David had manifeſted by this inſtance his muſical ſkill, we find him a volunteer in the army of Saul, and giving extraordinary proofs of his military prowefs, by his victory over Goliah, the champion of the Philiſtines, who had ſtruck ſuch a terror into his countrymen, that they all declined to accept his challenge, regarding him as invincible. David returning from the field of battle after his victory over the giant, was met by the women of all the cities of Iſrael, "ſinging and dancing, with tabrets, with joy, and with inſtruments of muſic." 1 Sam. xviii. 6. "And the women anſwered one another as they played, and ſaid," &c. This is an indubitable proof of a chant in dialogue, or, à dui cori, being in early uſe: and it was this which probably gave riſe to the manner of chanting the pſalms in the cathedral ſervice. Pſal. lxviii. ver. 25, the damſels play with timbrels in the proceſſion before the ark. Women, even, ſays Don Calmet, whom the apoſtle forbids to ſpeak in church, had the privilege to ſing there in company with the men. But many proofs might be alleged of a permiſſion being given for females to aſſiſt in the performance of ſacred rites. In 1 Chron. chap. xxv. where the muſical eſtabliſhments for religious purpoſes are all enumerated, we are told, that "God gave to Heman fourteen ſons and three daughters. And all theſe were under the hands of their father for ſong, in the houſe of the Lord, with cymbals, pſalteries, and harps." But Miriam, Deborah, Judith, and Anne, the mother of Samuel, are all regarded by the Jews, not only as ſingers, but as poeteſſes and propheteſſes.

In the reign of king David, muſic was held in the higheſt eſtimation by the Hebrews. The genius of that prince for muſic, and his attachment to the ſtudy and practice of it, as well as the great number of muſicians appointed by him for the performance of religious rites and ceremonies, could not fail to extend its influence, and augment its perfections: for it was during this period that muſic was firſt honoured, by being admitted in the miniſtry of ſacrifice, and worſhip of the ark; as well as by being cultivated by a king.

"And David, and all the houſe of Iſrael, played before the

the lord, on all manner of inftruments, made of firwood, even on harps and on pfalteries, and on timbrels, and on cornets, and on cymbals." 2 Sam. chap. vi. ver. 5.

This is related 1 Chron. chap. xiii. ver. 8. in nearly the fame words:

"And David and all Ifrael played before God with all their might, and with finging and with harps, and with pfalteries, and with timbrels, and with cymbals, and with trumpets."

In all the tranflations thefe inftruments are differently named. In the Syriac we are told, that David and all Ifrael fung before the Lord, accompanied by the cithara, pfaltery, cymbal, and fiftrum.

The joy which David fhewed, upon this occafion, in leaping, dancing, finging, and playing, almoft naked, before the ark, feemed, in the eyes of his queen Michal, to exceed the bounds of moderation, fo much, that when fhe faw him from the window, "fhe defpifed him in her heart," 2 Sam. vi. 16. and, afterwards, upbraided him, in terms not very honourable to muficians in general.

"And Michal, the daughter of Saul, came to meet David, and faid, How glorious was the king of Ifrael today, who uncovered himfelf in the eyes of the hand-maids of his fervants, as one of the vain fellows fhamelefsly uncovereth himfelf!"

Now it is much to be feared, that by the vain fellows, the queen meant Levitical fingers, muficians by trade, who, perhaps, like the ancient priefts of the Syrian goddefs, the Galli, ufed to fing and play in the proceffions naked.

In the fifteenth, fixteenth, and twenty-third chapters of the firft book of Chronicles, there is a particular account and enumeration of all the muficians appointed by David in the fervice of the ark, before a temple was erected. 1 Chron. xxiii. 5. David appoints four thoufand of the Levites to praife the Lord with inftruments; and chap. xxv. v. 1. the number of fuch as were inftructed, and were cunning in fong, is faid to have been two hundred four-fcore and eight.

And, 1 Chron. ix. 33. we are told of "the fingers, chief of the fathers of the Levites, who remaining in the chambers, were free: for they were employed in that work day and night."

Before this time, it does not appear from the facred writings, that any other inftruments than trumpets, or finging, than in a general chorus of the whole people, was ufed in the daily celebration of religious rites; though others are mentioned in proceffions, and on occafions of joy and feftivity.

The royal pfalmift may well be ftyled by the Hebrews the "Sire of Sacred Song;" as his fublime poetical effufions and infpirations not only procured his nation fuch a mufical eftablifhment, as feems not to have been equalled in the fervice of religion in any other kingdom or empire in the world; and the canticles, hymns, and pfalms, then produced, are ftill in reverence and ufe throughout Chriftendom, at the diftance of 2856 years from the commencement of this tuneful and infpired monarch's reign.

David, John Peter, a native of the town of Gea, was initiated into the practice of furgery under M. le Cat, whofe daughter he married, in 1764. On the death of Le Cat, David fucceeded to the places of furgeon-in-chief to the hotel dieu at Paris, and profeffor of anatomy. He was alfo member of the Royal Academy of Sciences, and author of feveral ufeful practical works; the titles of the moft noted are, "Recherches fur la maniere d'agir de la Saignee," 1763, 12mo. The fame year he publifhed "Differtation fur ce qu'il convenient de faire, pour diminuer ou fupprimer le lait de females;" alfo "On the Manner of treating Pregnant Women, or Cautions with the view of preventing Abortion, or the premature Birth of the Child;" and in 1771, "A Philofophical Differtation on the Figure of the Earth." Haller. Bib. Eloy. Dict. Hift.

David I., king of Scotland, was brought up in England, where he married Maud, a grand-niece of William the Conqueror. He fucceeded his brother in 1124. The earldoms of Northumberland and Huntingdon devolved on him; but on his return to Scotland, he was welcomed with every mark of refpect and joy. His reign was profperous: and his attention to the adminiftration of juftice was truly exemplary. He decided himfelf the controverfies of the nobles, and watched with the greateft affiduity over the conduct of the ordinary judges. On the death of Henry I., king of England, he vindicated the caufe of his daughter, the emprefs Maud, and that of her fon, who was afterwards Henry II., againft the ufurpation of Stephen. To Stephen he refufed the cuftomary homage for his Englifh eftates, and obliged the northern nobles to fwear allegiance to Maud. At length, in 1139, a negociation took place, and Henry was put in poffeffion of all the Englifh eftates, on condition of acknowledging the power of Stephen. Maud afterwards landed in England, and fent her fon Henry to Carlifle, to receive the honour of knighthood from David. The remainder of his reign was profperous, excepting the affliction which he felt for the lofs of his only fon. He died at Carlifle in the year 1153, after a reign of twenty-nine years.

David II., king of Scotland, fon of Robert Bruce, was only five years old at the death of his father in 1329; he had, however, for political reafons, been already betrothed to Joan, fifter of Edward III. of England. The earl of Murray was appointed guardian to the young king, who foon found a rival in the perfon of Edward, fon of John Baliol, who, fupported by the Englifh, invaded the kingdom, was proclaimed king, and David, like his father, did homage as vaffal of England. For the prefent the youthful king and his fpoufe were fent to France for fecurity. The Scots made a noble ftand for independence: the patriotic caufe at length became triumphant, and David returned from the continent in the year 1342. He was received with joy, and made proper returns of gratitude to thofe who had vindicated his caufe. He now thought of revenging himfelf on England, and in 1346 he invaded the northern counties, and made great havock in his progefs. In a pitched battle fought at Neville's-crofs near Durham, he was defeated and taken prifoner. The king was carried to London, and confined in the tower till 1357, when he received his liberty, with an acknowledgment of his right to the crown, upon condition of a large ranfom. On his return, he altered the fucceffion to the throne from the fon of his eldeft to the fon of his youngeft fifter. He employed himfelf during the remainder of his reign, in compofing the feuds and diforders which prevailed in his own kingdom. He was often in England for the purpofe of negociation with Edward, who feems to have gained a complete afcendancy over him; fo that David ventured to propofe to his ftates, that Edward or his fon fhould fucceed him. This propofal, however, was not only rejected with indignation, but nearly occafioned an infurrection. His queen dying, he married a fecond time, but had no iffue. He died in 1371, in the 47th year of his age. Univer. Hift.

David, El David, one of the falfe Meffiahs of the Jews, who appeared at the end of the 12th century in Perfia; he profeffed himfelf the promifed Meffiah, who was deftined by heaven to lead them back to Judea, to re-eftablifh the kingdom and throne of David. His followers took up arms in his defence, and committed various acts of hoftility. At length he was betrayed and beheaded. His enterprife proved highly

highly disaſtrous to the Jews throughout the Perſian dominions, vaſt numbers of whom were plundered and butchered without any mercy, and without diſtinction of age or ſex, in revenge for the outrages which they had committed during their progreſs to the power and glory which they anticipated under their leader. Moreri.

David, Francis, a learned divine in the 16th century, was a native of Hungary. Of the place of his birth we have no account, nor are we informed under whom he ſtudied; he began life a Catholic, and employed his talents in oppoſing the progreſs of Calviniſm in Tranſylvania; he afterwards became a convert to the Lutheran faith, which he ſoon abandoned for the principles of the reformed church. He was next the advocate of Unitarianiſm in its moſt ſimple ſtate. He oppoſed Socinus in the notion of giving worſhip to Jeſus Chriſt, declaring that to invoke him was an unchriſtian error, which muſt incur the diſpleaſure of the Supreme Being; and that it was equally lawful to pray to the Virgin Mary and other deceaſed ſaints, who have at no time given evidence, either that they can hear our prayers, or beſtow any thing upon us. He is ſaid to have held ſome notions nearly allied to Judaiſm, and hence he and his party were called ſemi-Judaizers. David was perſecuted by Socinus and the ſect over which he preſided, and by their means, or at leaſt by their connivance, he was thrown into priſon, where he languiſhed for ſome years, until his death, which happened in 1579. He was author of "A Letter to the Churches of Poland, on the ſubject of Chriſt's Reign of a thouſand years upon Earth," and various other pieces. Moreri. See alſo the article Socinus in this dictionary.

David's, St., in *Geography*, is a city and ſee of a biſhop in the cantreve of Dewiſland, or land of St. Dewy, i. e. St. David, and county of Pembroke, South Wales, England. It is ſixteen miles ſouth-weſt of Haverford-weſt, and two hundred and fifty-ſeven from London. The city ſtands near the promontory of Pebidiog, the *Octopitarum* of Ptolemy, called in Engliſh St. David's head. It is a poor ill-built place, and only famous for its cathedral, which was built, according to Gyraldus, by Peter As, dioceſan, in the time of Henry II. but completed, according to Willis, in the reign of king John. It preſents at this time only the remains of its former ſplendour. The nave, conſidered as part of the original building, has ſeveral chapels and oratories in a ruinous ſtate, and containing many ancient monuments. In the choir are the tombs of Owen Tewdwr, or Tudor, and Edmund earl of Richmond, father to Henry the ſeventh. "It was this tomb, and the proud memorials of his other Tewdwr anceſtors, which induced king Henry VIII. to change the intention he had formed of removing the ſee to Carmarthen, as a more central and eligible part of the dioceſe." The modern church has been lately repaired and improved; the cieling of Iriſh oak is much admired, together with a perfect Moſaic pavement. The arch-epiſcopal ſee was removed to this place from Caerleon, owing to the perſecution of the Chriſtians under the reign of Diocletian, by its biſhop, David. From that time it had ſeven ſuffragan biſhoprics, but by the encroachments of the Engliſh, the ſees were ſucceſſively alienated, the archbiſhopric reduced to a ſingle dioceſe, and by the policy of the Engliſh court, the biſhopric became ſuffragan to the ſee of Canterbury.

The members of the preſent cathedral are the biſhop, who is alſo dean, a precentor, chancellor, treaſurer, four archdeacons, eight prebendaries, ſix canons, and curſal, amounting to twenty-two, which is the number of prebends. The other members are, a ſub chanter, four prieſt-vicars, four lay vicars, an organiſt, four choriſters, a maſter of the grammar-ſchool, a verger-porter, ſexton, and keeper of the church; in the whole forty-one.

The epiſcopal palace is now in ruins, and the biſhop's uſual reſidence is at Abergwily, near the town of Carmarthen. St. David's has neither fair nor market. The number of inhabitants cannot be exactly ſpecified. By the returns under the late act for the cantreve, or hundred, the number of houſes was 414, and of inhabitants 1803. Near St. David's-head is the iſland of Ramſey, called in Britiſh *Ynys Devanog*, the ancient Linden of the Romans; upon which once ſtood a chapel, dedicated to Devanus or St. Devanog. The iſland, which is the property of the biſhop, abounds with rabbits, and is famous for a peculiar breed of wild ſheep, nearly reſembling the *mouſlon* or the animal in its natural ſtate. Near Ramſey are ſeven ſmaller iſlands, called "*the Biſhop and his Clerks*," in alluſion to the original inſtitution of St. David's. They are little more than bare rocks, and are extremely dangerous to ſhips coming from the weſtward, when the wind blows ſtrongly in ſhore. Evans's Tour through South Wales. Brown Willis's Hiſtory of St. Davids. Malkin's Scenery of South Wales.

David's-*Iſland*, St., a pariſh in the Bermuda iſlands.

David's-*Point*, a cape on the north coaſt of the iſland of Grenada. N. lat. 12° 20′. W. long. 61° 26′.

David's-*Town*, a town of America, ſeated on the Aſſanpink river, in the ſtate of New Jerſey, and county of Hunterdon, 10 or 12 miles from Trenton. A boat-navigation has been lately opened by means of three locks between theſe towns.

DAVIDE, Giacomo, in *Biography*, one of the greateſt opera ſingers, with a tenor voice, that appeared on our ſtage during the laſt century. He arrived in England after we had ceaſed to have a capital performer with a *ſoprano* voice, and ſupplied his place, performing all the firſt men's parts as long as he ſtaid in this country. When he came here his voice was perhaps not ſo good as it had been; but he was a very great ſinger, with a good figure, and an excellent actor. He was not without pathetic powers, and expreſſion; but he had ſuch a facility in running diviſions, that he rendered *bravura* every air he ſung, into which he conſtantly introduced certain curious paſſages of reſearch and ſtudy, which were probably of his own invention, and which no other ſinger could execute; ſo that by too frequent repetition, they loſt their effect, by ceaſing to ſurpriſe, and to be thought wonderful! He never let a ſimple and plain paſſage be heard, which with his fine voice and ſober expreſſion would have pleaſed more, and with leſs expenditure of notes, than by all the unintelligible and unfelt difficulties with which he could diſguiſe the original melody. In ſhort, it was one general cry, that "he ſung too much," which the Italians expreſs by two ſimple words, *canta troppo*.

We have heard nothing of him lately; and he has probably ere now retired from the ſtage, if not from this world.

DAVIDISTS, Davidici, or David Georgians, a ſect of heretics, the adherents of David George, a native of Delft, who, in 1525, began to preach a new doctrine, publiſhing himſelf to be the true Meſſiah: and that he was ſent thither to fill heaven, which was quite empty for want of people to deſerve it. He is likewiſe ſaid to have denied the exiſtence of angels, good and evil, of heaven and hell, and to have rejected the doctrine of a future judgment. He rejected marriage, with the Adamites; held, with Manes, that the ſoul was not defiled by ſin; and laughed at the ſelf-denial ſo much recommended by Jeſus Chriſt. Such were his principal errors. He made his eſcape from Delft, and retired firſt into Frieſland, and then to Baſil, where he changed his name, aſſuming that of John Bruck, and died in 1556.

He left ſome diſciples behind him, to whom he promiſed, that he would riſe again at the end of three years. Nor was he altogether a falſe prophet herein; for the magiſtrates of that city being informed, at the three years end, of what he had taught, ordered him to be dug up, and burnt, together with his writings, by the common hangman.

There-

There are ſtill ſome remains of this ridiculous ſect in Holſtein, Frieſland, and other countries, whoſe temper and conduct ſeem to diſcredit the exaggerated account which ſome writers have given of their founder. He was probably a deluded fanatic and myſtic.

DAVIDOVA, in *Geography*, a lake of Ruſſia, in the government of Toboiſk, 208 miles N.N.E. of Turuchanſk.—Alſo, a town of Ruſſian Siberia, on the Lena, in the government of Irkutſch; 24 miles N.N.W. of Vercholenſk.—Alſo, a town of Ruſſian Siberia, in the government of Irkutſch, on the Kirenga: 60 miles S. of Kirenſk.

DAVID'S-HYTTAN, a ſmall town of Sweden, in the province of Daland or Dalecarlia, remarkable for its ſteel manufactory.

DAVIDSO, or DAVO, an iſland of Sweden in the province of Weſtmannland, which derives its name from St. David, the firſt preacher of the goſpel in Weſtmannland, who came from England about the year 1060, and founded a convent in this place.

DAVIDSON, a county of America, in Mero diſtrict, Teneſſee, bounded N. by the ſtate of Kentucky, E. by Sumner, and S. by the Indian territory. The chief town, Naſhville, lies on the great bend of Cumberland river, and is alſo watered by the Harpith and Stones rivers. It contains 9620 inhabitants, of whom 2936 are ſlaves, and furniſhes very large timber.

DAVIEL, JAMES, in *Biography*, a native of Barre, in Normandy, where he was born Aug. 11, 1696, ſtudied ſurgery, under his uncle at Rouen, and having completed his apprenticeſhip, he was ſent to the Hotel Dieu at Paris. The plague breaking out in 1719, at Marſeilles, he, with ſeveral other young ſurgeons, who had volunteered their ſervices, was ſent thither, furniſhed with regulations for their conduct, with the view of enabling them to eſcape the infection, and of giving ſuch aſſiſtance as art could afford to the afflicted with the diſeaſe. Daviel, who had the good fortune to eſcape being infected, had acquired ſo much credit for the intrepidity and humanity of his conduct, that, ſoon after the ſubſidence of the plague, he was appointed reader in anatomy, a poſt he continued to fill for twenty years. Having made the anatomy and diſeaſes of the eye, in a particular manner, the objects of his attention, he acquired ſo much reputation for his ſkill in performing the operation for the cataract, that perſons came to conſult him from all parts of the kingdom. He at firſt depreſſed, or couched the cataract, but not being able to ſucceed in that way, in one of his patients, he extracted the cryſtalline humour, and effected a complete cure. This was in the year 1747. The ſame year he removed to Paris, where his fame having preceded him, he is ſaid to have performed the operation, by the new method, on two hundred and ſix patients, and that it completely ſucceeded with one hundred and eighty two of the number. He was ſoon after made aſſociate of the academy of ſciences at Toulouſe, of the inſtitution of Boulogne, and of the royal academy of ſurgery at Paris. Daviel continued increaſing in reputation, until, by the failure of his health, he was incapable of attending the duties of his profeſſion. In 1760 he ſuffered a ſtroke of palſy; from that time his ſtrength declined, and in Sept. 1762, a return of the paralytic affection put an end to his life. Haller Bib. Surg. Eloy Dict. Hiſt.

DAVIES, JOHN, born at Lanvaethley, in the iſland of Angleſey, in 1534, received his education at Oxford, where he reſided four years; but having taken his degree of bachelor in arts, he obtained leave of his friends to travel into Italy. He now attended diligently to the ſtudy of medicine, and having taken the degree of doctor in that faculty, at Sienna, he returned to his native country, and acquired conſiderable fame by his ſkill and ſucceſs in practice, which he continued to the year 1609, when he died. He left no profeſſional work, but he is ſaid to have occaſionally printed ſome poems, which have not ſurvived; and a work on the Italian and Engliſh language. Eloy Dict. Hiſt.

DAVIES, JOHN, a learned Welſh divine, was born in Denbighſhire, and educated by William Morgan, afterwards biſhop of St. Aſaph. He finiſhed his ſtudies, and took the degree in arts at Jeſus college. In 1616 he took his degree of doctor in divinity, and was made canon of St. Aſaph. His character was held in high eſtimation for his deep and very accurate knowledge in the Greek and Hebrew languages, and for his acquaintance with ancient writings, and curious and rare authors. His principal works are, "Antiquæ Linguæ Britannicæ nunc communiter dictæ Cambro-Brittannicæ, a ſuis Cymrææcæ, vel Cambricæ, ab aliis Wallicæ rudimenta," &c. 1621, 8vo. "Dictionarium Britannico-Latinum." 1632, folio. Among the MSS. in the Bodleian Library is preſerved a piece of Dr. Davies, entitled "Adagiorum Britannicorum Specimen." The doctor aſſiſted likewiſe William Morgan and Richard Parry, ſucceſſive biſhops of Landaff, in making the verſion of the Welſh bible, which was publiſhed in the year 1620. Gen. Biog.

DAVIES, SIR JOHN, an eminent perſon, as a poet, lawyer, and political writer, was born as Chiſgrove, Wiltſhire, in 1570. He ſtudied at Queen's college, Oxford, and afterwards removed to the Temple in purſuit of the law. He was called to the bar in 1595, but on account of ſome miſconduct, occaſioned by the violence of his temper, he was expelled from that ſociety. He ſeems to have been fully aware of the raſhneſs of his conduct, and retired to Oxford, as well to correct the paſſion to which he was liable, as to devote his time to the muſes. In a poem entitled "Noſce Teipſum," he acknowledges his obligation to affliction in aiding the reformation of his temper:

"This miſtreſs lately pluck'd me by the ear,
And many a golden leſſon hath me taught;
Hath made my ſenſes quick, and reaſon clear;
Reform'd my will and rectified my thought."

By this piece he eſtabliſhed his reputation as a poet, and as a ſolid judicious thinker. In 1601, Mr. Davies very laudably made ſuch ſubmiſſion for his paſt conduct as reſtored him to his chambers in the Temple. In the ſame year he was choſen member of parliament for Corfe Caſtle, and took a ſpirited part in the debates reſpecting monopolies. On the acceſſion of king James, he was particularly noticed by his majeſty, as the author of "Noſce Teipſum;" and in 1603 he was ſent to Ireland as Solicitor General, and was ſoon after made attorney-general, and a judge of aſſize; and in 1607, the honour of knighthood was conferred on him. In Ireland he was extremely inſtrumental in conveying the benefits of equal laws to thoſe parts of the iſland which had hitherto been ſtrangers to them. On his return to England he laid before his ſovereign an account of all that had been done towards the civilization of Ireland, an object which he had much at heart, and which he purſued on going back moſt aſſiduouſly. In 1612 he publiſhed "A Diſcovery of the true Cauſes why Ireland was never entirely ſubdued and brought under Obedience of the Crown of England, until the Beginning of his Majeſty's happy Reign." This work was deemed extremely valuable, and it is remarkable that in the ſame year a parliament was convoked in Ireland, the firſt in that kingdom formed by a general repreſentation; and in this, Catholics as well as Proteſtants ſat, in almoſt equal numbers. Sir John Davies was

elected

elected member for Fermanagh, and was chosen speaker in the house by the court party. Sir John, in his opening speech, was said to be guilty of much adulation toward the king, who had shewn him many tokens of his favour. In 1614, he published "A Declaration concerning the Title of the Prince of Wales," and in 1615, "Reports of Cases adjudged in the King's Courts of Ireland." To this volume is prefixed a very learned and eloquent eulogy on the common law of England, and a vindication of its professors. He soon after returned to England, and went several circuits as judge. He was now elected member of parliament for Newcastle-under-Line, and sat in the parliament of 1621. He died in 1626, in his fifty-seventh year, after having been lately appointed lord-chief-justice of England. The principal prose works of sir John Davies were published in one volume 8vo. 1786, under the title of "Historical Tracts," &c. Sir John Davies left two children, a son an ideot, and a daughter married to Ferdinando lord Hastings. Biog. Brit.

DAVIESIA, in *Botany*, a New Holland genus of Papilionaceous plants, with ten distinct stamens, named in honour of the Rev. Hugh Davies, F.L.S. of Beaumaris, one of the chief contributors in Welsh plants to Mr. Hudson's "Flora Anglica," as well as to the "Flora Britannica" and "English Botany" of Dr. Smith and Mr. Sowerby, and author of a paper, on four British Lichens, in the 2d vol. of the Linnæan Society's Transactions. Sm. Tr. of Linn. Soc. v. 4. 220. Ann. of Bot. v. 1. 506. Class and order, *decandria monogynia*. Nat. Ord. *Leguminosæ*, sect. 4. Juss.

Gen. Ch. *Cal.* campanulate, angular, in five various segments, without any appendages. *Cor.* papilionaceous, of five petals; standard inversely heart-shaped, broad, reflexed; wings shorter, obliquely obovate; keel rather shorter than the wings, of two petals, each with a tooth above, near the base. *Stam.* ten, enclosed in the keel; filaments awl-shaped, equal, distinct, ascending, conniving; anthers roundish. *Pist.* Germen superior, ovate, compressed; style ascending, awl-shaped, reaching to the anthers; stigma simple, acute. *Peric.* Legume compressed, of one cell, and two cartilaginous elastic valves. *Seed* solitary, kidney-shaped, compressed, much smaller than the cavity.

Eff. Ch *Calyx* angular, simple, five-cleft. *Corolla* papilionaceous. *Style* awl-shaped. *Stigma* simple, acute. *Legume* compressed. *Seed* solitary.

Sp. 1. D. *acicularis*. Sm. in Sims and Konig's Annals of Bot. v. 1. 506. "Leaves linear, revolute, pungent, straight, rough, with minute teeth. Flowers axillary, solitary." *Stem* shrubby, branched, rigid. *Leaves* sessile, scattered, numerous, linear, narrow, an inch long, revolute, rough to the touch, each tipped with a sharp spine, with a very minute pair of awl-shaped stipulas at their base. *Flowers* axillary, solitary, on very short stalks, bearing a few concave, roundish, smooth bracteas. *Calyx* divided half way down into five acute, nearly equal, teeth. *Petals* yellow, variegated with crimson. It is almost peculiar to this genus, that, in drying, the yellow turns white, and the crimson becomes a dull purplish brown. *Legume* semi-ovate, sharp-pointed, perfectly compressed, about four lines long, of a rich polished chesnut-colour. A native of New South Wales, near Port Jackson. John White, M.D. 2. D. *incrassata*. "Leaves linear-wedge-shaped, compressed, vertical, oblique, thick, spinous. Flowers axillary, solitary." Sm. MSS. Whole shrub of a thick and seemingly succulent habit. *Leaves* perfectly decurrent, scattered, vertical, rough to the touch, compressed, recurved, linear, but dilated into a sort of angle at the upper edge, by which they become wedge-shaped. *Stipulas* wanting. *Flowers* few, yellow. Found at King George's Sound, on the west coast of New Holland, by Mr. A. Menzies. 3. D. *ulicina*. Sm. in Ann. of Bot. v. 1. 506. Donn. Cant. 76. (D. ulicifolia; Andr. Repos. t. 304.) "Leaves lanceolate, flat, pungent, straight, smooth. Flowers axillary, solitary." Sm. MSS. A rather more humble and more bushy shrub than either of the former, with sessile, not decurrent, small, lanceolate, smooth leaves. *Flowers* copious, on small, bracteated, solitary stalks, yellow, with a crimson crescent-shaped spot in front of the standard, and a stain of the same hue at its back, which style of colouring seems universal in this genus, as far as we have seen, as likewise frequently in others of the same natural tribe. *Pod* ovate, pointed, flattened. Brought from Port Jackson, and long ago raised from seed by several cultivators about London, being the only real species of *Daviesia* cultivated in Britain. It thrives in sandy peat earth, with the shelter of a green-house, but must be sparingly supplied with water in winter. It flowers plentifully in May or June. 4. D. *reticulata*. "Leaves lanceolate, pungent, reticulated with veins on both sides. Stipules in pairs, within the insertion of the leaves. Flowers axillary, solitary." Sm. MSS. A small branching shrub, of which we have seen only a dried specimen, gathered by Mr. Menzies near King George's Sound, New Holland. Its numerous *leaves*, rather above half an inch long, are most elegantly reticulated on both sides with fine yellow interbranching veins. *Stipulas* intrafoliaceous, or standing within the insertion of each leaf, a very remarkable character, this being the only species, except the first, in which these organs have been observed at all, and they here approach greatly to the nature of the stipulas of the genus *Puttenæa*, as also do the bracteas of the present plant, being silky at their backs, and closely imbricated round the base of the almost sessile flower. The *calyx*, however, decides the genus, being angular, and destitute of appendages. The *legume* has not been seen. 5. D. *squarrosa*. Sm. in Ann. of Bot. v. 1. 507. "Leaves heart-shaped, pungent, reflexed, rough in the margin. Flower-stalks axillary, single-flowered, mostly solitary." A native of the country not far from Port Jackson, New South Wales, whose thick woody perennial *root* throws up numerous, slender, wand-like, furrowed, rough, slightly branched *stems*, two feet high, clothed from top to bottom with numerous, small, scattered, sessile, reflexed, heart-shaped, *leaves*, whose edges are thickened and rough, and their points spinous. From the bosom of each leaf springs one, rarely two, slender, smooth, simple *flower stalks*, about as long as the corresponding leaf, with a few concave, roundish *bracteas* about the lower part. *Flowers* solitary, smaller than in any of the former, but apparently of the same colours, with an obscurely two-lipped calyx. 6. D. *umbellulata*. Sm. in Ann. of Bot. v. 1. 507. "Leaves lanceolate, flat, pungent. Flower-stalks axillary, solitary, each bearing an umbel of about four flowers. Calyx truncated." Allied to the last in habit, and a native of the same country. *Leaves* much longer, lanceolate, spreading, nearly smooth. *Flower-stalks* shorter than the leaves, bearing a few little scattered *bracteas*, and an umbel of about four flowers, with several larger bracteas at its base. These *flowers* differ from those of D. *squarrosa*, in having the upper lip of the *calyx* singularly truncated, and not cloven. The calyx in this genus is a part of the fructification which most differs among species otherwise the nearest akin. 7. D. *corymbosa*. Sm. in Ann. of Bot. v. 1. 507. "Leaves linear-oblong, flat, unarmed. Flower-stalks axillary, in pairs, corymbose, many flowered. Calyx regular." Gathered by colonel Paterson, near Hawksbury river, New South Wales. It is larger than the last. *Leaves* five

five or six inches long, resembling those of several *Mimosæ* of New Holland, almost lanceolate, slightly oblique, entire, smooth, acute, but not tipped with a spine. *Flower-stalks* axillary, in pairs, corymbose, rather unequal, one being earlier than the other, both shorter than the leaf. *Bracteas* one under each partial stalk, and some scattered. *Flowers* numerous, their calyx-teeth as nearly equal and regular as they can be in a papilionaceous flower. 8. D. *cordata.* "Leaves heart-shaped, clasping the stem, reticulated with veins. Flower-stalks axillary, clustered, corymbose, many-flowered. Calyx truncated." Sm. MSS. This species is very remarkable for its large heart-shaped *leaves*, three or four inches long, clasping the very angular branches. They are firm and coriaceous, marked with a prominent net-work of innumerable veins. *Flower-stalks* corymbose, unequal, four or five from the bosom of each leaf, bracteated, many-flowered. Two upper teeth of the *calyx* combined and truncated as in the 6th species. This is a native of the country near King George's Sound, and is one of the largest of its genus, having the habit of some great *Borbonia* or *Crotalaria.* 9. D. *alata.* "Stem leafless, winged. Umbels lateral. Calyx and bracteas fringed." Sm. MSS. A very remarkable species, found near Port Jackson, but few specimens have been brought to Europe. The adult *stem* is triply winged throughout, the wings smooth, entire, even, about a line broad, tapering down to the base of each branch, and only interrupted here and there by buds, scattered alternately along the branches. *Umbels* solitary from several of the upper buds, on short bracteated stalks, mostly five-flowered. Immediately under the rays of the umbel several larger bracteas, very remarkably jagged or fringed, and the elongated, nearly equal, teeth of the *calyx* are fringed in the same manner, which is one of the striking peculiarities of this plant. 10. D. *juncea.* "Stem leafless, round, furrowed, naked. Umbels lateral. Calyx and bracteas entire." Sm. MSS. Brought by Mr. Menzies from King George's Sound. Its rushy habit, somewhat like *Spartium junceum*, the *stem* being round, furrowed, roughish, without any wings, renders it abundantly distinct from the last, to which it is otherwise next akin. The *bracteas* and *calyx*, moreover, are not at all fringed; the former are peculiarly concave and ribbed; the latter nearly regular, indeed, but the five teeth are short, their edges very minutely downy only. *Petals* of both these species, as far as can be judged from dried specimens, of the same colours as in the generality of the genus.

Propagation and Culture.—All the species are shrubby, and, probably, like papilionaceous plants in general, best raised from seeds, which, in this tribe may, for the most part, be kept long, and transported to a great distance. It is rather remarkable that seeds of D. *ulicina* only, as far as we are informed, have succeeded in Europe. Of the cultivation of this we have already spoken. It is said also to be capable of being multiplied by cuttings, which is needless, as its seeds ripen well in our green-houses. S.

DAVIESIA *denudata.* Venten. Choix. t. 6. See VIMINARIA *denudata.*

DAVILLA, HENRY CATHERINE, in *Biography*, a celebrated Italian historian, was born in the year 1576, in Padua. His father held a considerable post in the kingdom of Cyprus, when the island was captured by the Turks, by which event he was reduced to poverty. At an early age Henry was taken into France, and was soon after made a page at court. He entered into the military service, and gave some signal proofs of courage, in which his life was often in imminent danger. In 1599, he returned to Padua at the desire of his father, and, upon his death, Henry engaged in the service of the Venetian republic, by which he was employed in duties of the highest import; and in these acquitted himself so well, and so much to the satisfaction of the senate, that he was permitted to stand next the doge, as his ancestors, the constables of Cyprus, had formerly done. Notwithstanding his various active employments, Davilla found time for literary pursuits: in 1631 he published in Italian, his "History of the civil Wars of France." It comprehends the events of 40 years, *viz.* from the death of Henry II. to the peace of Vervins, in 1598, and is highly esteemed for the perspicuity of the style and arrangement, and for the fidelity and accuracy of the facts. His reflections are judicious and sensible, and his narrative is pleasant and lively. In the following year he was appointed to the command of Crema, and set out from Venice on his journey: an unfortunate dispute arose between him and the person who was bound to furnish him with carriages, which terminated in the death of Davilla, who was shot dead by his brutal opponent in the presence of his wife and children. Some other persons were killed and wounded in the affray; but one of his sons revenged the death of his father on the murderer. The best editions of Davilla's history are that of the Louvre in 1644; of Venice in 1733; and that printed in London in 1755. It has been translated into several modern languages. Moreri.

DAVIS, JOHN, an able navigator, who has given name to a strait leading to Baffin's bay, was born at Sandridge, near Dartmouth. He shewed at a very early age a strong disposition for a maritime life, and by his great assiduity, after he was admitted to follow the bent of his inclination, he acquired great reputation. In 1585 he was entrusted with the conduct of an expedition, for exploring a north-west passage from America to the East Indies. He proceeded to Greenland, and after passing the most southerly point, he came to that strait which has ever since borne his name. Having failed up the strait thirty leagues or more, he returned to England. In a second expedition he explored the coasts and inlets which he had only seen before. And in a third, in 1587, he entered the strait again, and failed as far as lat. 73°: he then failed westward till he fell in with American land; from the circumstances attending these voyages he became sanguine in the expectation of finding a passage; but the threatened Spanish invasion obliged him to return home. He failed, 1591, to the South-seas, as captain of the Desire, under the command of Mr. Cavendish, by whom he was charged with misconduct in deserting him. After this Mr. Davis made five voyages to the East Indies, in the capacity of pilot. During the last he lost his life, in an engagement with some Japanese, on the coast of Malacca. This happened at the close of the year 1605. He left behind him an account of some of his voyages, and other tracts. Biog. Brit.

DAVISBURG, in *Geography*, a post-town in Christian county, Kentucky, 816 miles W. of Washington.

DAVIS'S *Cove*, a cove on the west coast of the island of Jamaica; two miles N. of Green-island harbour.

DAVIS'S *Inlet*, a river or arm of the sea, on the E. coast of Labrador, the mouth being situate in N. lat. 56° 20′. W. long. 60° 10′.

DAVIS'S *Land.* See EASTER *Island.*

DAVIS'S *Quadrant.* See BACK-STAFF.

DAVIS'S *Strait*, in *Geography*, a narrow sea which separates the north main of America from the western coast of Greenland, running N. W. from Cape Farewell, N. lat. 60°, to Baffin's bay, in N. lat. 80°, and extending to W. long. 75°, where it communicates with Baffin's bay, which lies to the north of this strait, and of the north main, or James's island.

iſland. It is called Davis's ſtrait, becauſe it was diſcovered in 1585 by Mr. John Davis, an experienced navigator, who viſited the weſtern coaſt of England, and explored this narrow ſea, improperly ſo denominated, becauſe it is as wide as the Baltic.

Davis *Town*, a town of America, in the diſtrict of Maine, and county of Lincoln, containing 308 inhabitants.—Alſo, a town in the ſame diſtrict, and county of Hanerek, containing 269 inhabitants.

DAVIT, in *Ship-rigging*, denotes a ſhort boom fitted in the fore-channel, and uſed as the arm of a crane to hoiſt the flukes of the anchor clear of the ſhip's ſide, till high enough to lie on the gun-wale, and faſtened by the ſhank painter.

Davit-*Guys*, are ropes uſed in the rigging of ſhips, which have an eye ſpliced in one end to the circumference of the davit-head; they are ſerved with ſpun-yarn over the ſplice, and whipt with ſpun-yarn at the other end.

Davit-*Rope*, denotes the laſhing which ſecures the davit to the ſhrouds, when out of uſe.

DAULI, in *Geography*, a town of South America, in the audience of Quito, and juriſdiction of Guayaquil.

DAULIA, in *Ancient Geography*, a town of Macedonia, in the canton of Eordetes, and near Scampis. Ptolemy.—Alſo, a country of the Phocide, which includes another diſtrict called *Tronis*.

DAULIS, a town of the Phocide, at ſome diſtance S.E. from Delphi. Homer, Pauſanias, and Steph. Byz. name it Daulis; but Polybius calls it Δαυλις, Daulium. According to Pauſanias, this town was very populous, and its inhabitants were the largeſt and moſt robuſt of any in the Phocide territory. At Daulis was a temple of Minerva, with two ſtatues of this goddeſs. It was more anciently called *Anaoris*. On the ruins of this town is a village, containing 40 or 50 houſes; and in this village is a river, which ſprings among the rocks of Parnaſſus, and which the people of the country call *Mauroneri*, *i. e.* black water, ſuppoſed to be that which the Greeks call Melas.

DAULSEN, in *Geography*, a town of Germany in the circle of Weſtphalia, and county of Verden; 4 miles N.N.E. of Verden.

DAUMA, a kingdom of Africa, in Negroland, with a town of the ſame name. N. lat. 8°. W. long. 16° 24′.

DAUMAZAN, a ſmall town of France, in the department of the Arriége, 12 miles N. W. of Pamiers.

DAUN, Leopold, Count of, in *Biography*, a celebrated general in the Auſtrian ſervice, was born in the year 1705, and intended by his father, who was an imperial general, for the church. The young man, however, was of an active turn, and deſirous of treading in the ſteps of his parent, obtained firſt an admiſſion among the knights of Malta. In the year 1740, he was made a colonel, and diſtinguiſhed himſelf in the war which Maria Thereſa ſuſtained in defence of her hereditary ſucceſſion. In the war of 1756, he was known and diſtinguiſhed as the moſt formidable antagoniſt of the king of Pruſſia: in the following year he entirely defeated the monarch, and was, on that account, highly eſteemed by the empreſs-queen. In 1758, he ſaved Olmutz by a ſeries of very judicious movements, and afterwards engaged with, and again defeated, the Pruſſian ſovereign. In 1760, when Dreſden was attacked by the king, Daun at reſt compelled him to relinquiſh his attempt, but he was, at length, owing to a ſevere wound, defeated, and obliged to quit the field. He died at Vienna in 1766, highly eſteemed as well for his private virtues, as for his military talents. Through the whole of life he was indefatigable in every thing entruſted to him: he evinced on almoſt every occaſion conſummate ſkill; but has been thought defective in the ſpirit of enterprize and deciſion, which enables a general to ſeize and improve a favourable moment. Nouv. Dict. Hiſt.

Daun. See Dauhn.

DAUNIA, in *Ancient Geography*, a country of Italy in Apulia. Pliny ſays, that it lay N. W. of Peucetia, and that it was bounded to the eaſt and north by the Adriatic ſea, to the weſt by Biſerno, the country of the Samnites and that of the Hirpini, and to the ſouth by mount Cervago, which ſeparated it from Peucetia. Its chief towns were Sipuntum, Arpi, Luceria, &c. Strabo ſays, that thoſe people were called Daunians by the Greeks, whom the Latins called Apulians.

DAUNUS, *Caravalle*, a torrent of Italy, which gave name to the country in its vicinity. Horace mentions the extreme heat of this country.

DAVOS, Davas, or Tafaas, in *Geography*, formerly a juriſdiction of the league of the ten juriſdictions, in the country of the Griſons, in Switzerland, is at preſent a diſtrict of the canton of the Griſons in the Helvetic republic. It is a long plain, a quarter of a mile broad, and gradually riſing into hills which terminate in high mountains. A clear murmuring ſtream flows through the midſt of the plain, with a gentle but lively courſe. The whole diſtrict is divided into five pariſhes, and the inhabitants are Proteſtants. The houſes, however, are ſo diſperſed as not even to form one ſingle village, properly ſo called. Near the church of St. John is a ſmall cluſter of eight or ten houſes; in the other parts the cottages are thickly ſtrewed over the plain. There are two lakes abounding in fiſh, and ſome mines of ſilver, copper, and lead ore. The pariſh of Sartig has a mineral ſpring. The country produces oats, rye, large quantities of rich paſture, yielding yearly two crops of hay. The mountains are overſpread with foreſts of fir and larch, intermixed with meadows. Above them tower the rugged Alps.

Grazing is the principal occupation of the inhabitants of the diſtrict of Davos. They alſo keep pack-horſes for the tranſport of the goods which paſs through their country from Germany and Switzerland into Italy, and they manufacture plenty of wooden wares. They ſpeak German, but their pronunciation is as defective as that of the inhabitants of the republic of the Valais.

The general diet of the Griſons uſed to be held at Davos. Coxe's Switzerland. Dictionnaire de la Suiſſe.

DAUPHIN, Dolphin, in *Aſtronomy*. See Delphinus.

Dauphin, in *Conchyliology*, the name of a ſpecies of ſhell-fiſh. It is one of the round-mouthed ſnails, or cochleæ lunares; and is ornamented with rows of indented eminences, on all the turns of the ſhell.

Dauphin, in *Geography*, an iſland in the north part of the gulph of Mexico, at the mouth of the river Mobile, five miles from Maſſacre iſland, with a ſhoal every where between them; which iſlands were ſuppoſed formerly to have been but one, and to have been known by the name of Maſſacre, ſo called by M. d'Ibberville, from a large heap of human bones, found by him at his landing. Dauphin iſland is about five leagues long, but narrow, and very barren. At the weſt end, for a diſtance of between three and four miles, is a narrow ſlip of land, with ſome dead trees; the reſt is covered with thick pines, which come cloſe to the water's edge, on the E. ſide, forming a large bluff. The French attempted a ſettlement here, and the cultivation of tobacco, which was ſaid to be equal to that of Virginia. On the S. ſide of the iſland there are remains of an old French poſt, and of ſome old houſes of the natives. In 1719 the Spaniards made a fruitleſs attempt to take it, during the ſpace of four days. N. lat. 30° 15′. W. long. 88° 10′.

Dauphin, a county of America, in the ſtate of Pennſylvania, formerly contained in that of Lancaſter, but erected into a ſeparate county in 1785. Its form is triangular; it is ſurrounded by the counties of Mifflin, Cumberland, York, Berks, and Northumberland, and it contains 586,400 acres. It is divided into nine townſhips, the chief of which is Harriſburg; the number of its inhabitants is 22,270. About one half of this county is cultivated; but the northern part is very rough and mountainous. In ſeveral of the mountains is found abundance of iron ore of the beſt quality; and a furnace and forge have been erected for the manufacture of pig, bar iron, &c. The firſt ſettlers were Iriſh emigrants, who were afterwards joined by a number of Germans.

Dauphin, a name given in the reign of Henry IV. of France, to the iſland of Madagaſcar.

Dauphin *Creek*, a creek at the S.E. extremity of Madagaſcar, near fort Dauphin.

Dauphin *Fort*, a fort at the ſouth-eaſtern extremity of the iſland of Madagaſcar, in the province of Cercanoſſy. The diſtrict of the iſland about this fort is well peopled. Almoſt every village ſtands on an eminence, encompaſſed by two rows of ſtrong paliſades. Within ariſes a parapet of earth, four feet high; and large, ſtrong bamboos, placed at the diſtance of five feet from each other, form a kind of fortification which defends theſe villages, which, in ſome caſes, are ſurrounded by a foſſe, ten feet broad, and ſix feet deep. The dwelling of the chief is called "donac," and this compriſes three or four large houſes, incloſed by a particular fence. Here the chief always reſides, with his wives and children. Slaves keep guard night and day at the doors of the donac. Fort Dauphin was burnt down in the year 1655; and not rebuilt till 1663. S. lat. 25° 15'. E. long. 69° 5'. See Madagascar.—Alſo a juriſdiction, fort, and ſea-port town in the N. part of the iſland of St. Domingo; containing 5 pariſhes.—Alſo a fort in the iſland of Cape Breton.

Dauphin *River*, a river of upper Canada, which runs into lake Winnipeg on the W. ſide, at the head of Martin's bay. N. lat. 52° 15'.

Dauphin is the title which the eldeſt ſons of the kings of France, and preſumptive heirs to the crown, bore, for nearly 450 years, till the year 1791, when, in order to aboliſh every the moſt remote veſtige of feodality, the national aſſembly decreed its ſuppreſſion, and ſubſtituted the appellation of *Prince royal*.

Charles Louis, the laſt dauphin, ſon of Louis XVI. and Maria Antoinetta of Auſtria, born on the 27th of March 1785, was firſt named duke of Normandy, and took the title of dauphin only after the death of his elder brother Louis Joſeph Xavier Francis, in 1790. The rejoicings which took place in France at the birth of this laſt prince in 1781, evinced ſuch a ſincere and enthuſiaſtic attachment to the royal family, that it forms the moſt ſtriking contraſt with the events which took place eleven years after. Charles Louis did not enjoy the new title of prince royal much longer than he had enjoyed that of dauphin. On the 11th of Auguſt, 1792, he was impriſoned at Paris with his royal parents in the Temple. On the 24th of September of the ſame year, the abolition of royalty in France was decreed by the convention; and after the execution of the unfortunate monarch his father, which took place on the 21ſt of January, 1793, the young prince continued a priſoner till the middle of the year 1795, when his unjuſt and cloſe confinement probably haſtened his death. His complaint is reported to have been of the ſcrofulous kind, and it does not appear that medical aid was denied him; but his comforts had been ſhamefully abridged, and his education abſolutely neglected, and moſt wilfully perverted. He expired on the 9th of June 1795, at the age of ten years two months and thirteen days. The writers of the royaliſt party in France, conſidering this prince as lawful heir to the throne, ſtyled him king ever after the demiſe of his ill-fated parent, by the name of Louis XVII.; which ſee.

The title of dauphin was firſt borne in France about the year 1345, by Philip, a younger ſon of Philip de Valois, to whom Humbert III. dauphin of the Viennois, had ceded his dominions, conſiſting chiefly of the dauphiné. However, after Charles V. ſurnamed the *Wiſe*, the kings of France never conferred the appellation of dauphin on any one, but their eldeſt ſons, and preſumptive heirs of the crown. The title itſelf took its riſe about the year 1120 in Guigues IV. ſon of Guy or Guigues the Fat. Being of a warlike diſpoſition, he choſe a dolphin for the creſt of his helmet; and having ſignalized himſelf by ſome exploit, he was probably diſtinguiſhed by the name of his armorial bearings, and tranſmitted this name as a new diſtinction to his deſcendants.

The ſeigneurs, or lords, of Auvergne, have likewiſe borne the appellation of dauphin; but the dauphins of Auvergne had it not till a good while after thoſe of the Viennois, and even received it from them. The manner was this: Guy VIII. dauphin of Viennois, had by his wife Margaret, daughter of Stephen, earl of Burgundy, a ſon and two daughters. The ſon was Guy IX. his ſucceſſor. Beatrix, one of the daughters, was married to the count d'Auvergne, who, according to Blondel, was William V. or rather, as Chorier and others hold, Robert VI. father of William V. This prince loſt the greateſt part of the county Auvergne, which was taken from him by his uncle William, aſſiſted by Louis the Young; and was only left maſter of the little canton whereof Vodable is the capital. He had a ſon whom he called Dauphin, on account of Guy, or Guigues, his uncle by the mother's ſide. From his time his ſucceſſors, holding the ſame petty canton of Auvergne, ſtyled themſelves dauphins of Auvergne, and bore a dolphin for their arms.

Dauphin, in *Mechanics*, &c. See Dolphin.

Dauphins, or Delphins, in *Literary Hiſtory*, a name given to the commentators on the ancient Latin authors, who were employed by order of Louis IV. of France, for the benefit of the prince, under the care and direction of M. de Montauſier his governor, Boſſuet and Huet his preceptors. They were thirty-nine in number.

DAUPHINE', in *Geography*, one of the ſouth-eaſtern provinces of France, before the revolution of 1789. It contained the following counties, *viz.* the Gréſivaud and the Viennois, which form now the department of the *Iſère*, which ſee; the Valentinois and the Diois, which conſtitute at preſent the department of the *Drôme*, which ſee; and the Gaſſençais, Embrunais, and Briançonnais, which form now the department of the *Hautes Alpes*, which ſee. Grenoble was the capital of the whole province. The territorial extent of the Dauphiné was eſtimated at 1006 ſquare leagues, and its population at 804,800 individuals, or 800 inhabitants per ſquare league.

DAUSARA, or Doysara, *Dauſar*, in *Ancient Geography*, a town of Aſia, in Meſopotamia, ſeated upon the banks of the Euphrates, nearly S. of Edeſſa, and S.E. of Nicephorium.

DAUSENAS, in *Geography*, a town of the duchy of Courland; 16 miles W.S W of Seilburg.

DAUTONA, in *Ancient Geography*, a town of Higher Pannonia, 24 miles from Siſcia, according to the Itinerary of Antonine.

DAUW, in *Geography*, a town in the ſouthern part of the iſland of Celebes.

DAVYING, in *Agriculture*, a term applied provincially to

to the getting of marl out of the face of the cliffs on the sea coasts, where it is drawn up by a sort of wince.

DAW, in *Ornithology*. See CORVUS *Monedula*: called also the jackdaw.

DAW, *Surinam*. See CORVUS *Surinamensis*.

DAW, *Black and Yellow*. See ORIOLUS *Persicus*.

DAWEL-CORONDE, in the language of the Ceylonese, drum-cinnamon. This is called in Low Dutch, trommel cancel. The reason of the name is, that the wood of the tree which affords this species, when dried, is light and tough, and is used to make drums of. The bark is taken off while the tree is growing, and is of a pale colour. It is a very bad kind of cinnamon, and is very rarely sold as such; but the natives use it in medicine.

DAWES, RICHARD, in *Biography*, was born in 1708, and received the early part of his education at Market-Bosworth, Leicestershire, under Dr. Blackwall, author of the "Sacred Classics." The higher branches of study he pursued at Emanuel college, Cambridge, where he took his degrees, and where he exhibited much enmity and rancour against the learned Bentley, whose knowledge in the Greek he affected to treat with contempt. About the year 1738, he was appointed master of the free grammar-school at Newcastle-on-Tyne, to which office was annexed the mastership of St. Mary's hospital in that town. The profound learning of Mr. Dawes did not qualify him for the discharge of the laborious duties of a school-master: his temper was too irritable, and his character was so singular, that he was perpetually involved in quarrels. In about ten years he was persuaded to resign both places, and to accept, in exchange, an annuity of 80*l.* *per ann.* with which he retired; making his chief amusement rowing a boat on the river near his house. He died in 1766; but as a critic and a scholar he had laid a broad basis for permanent reputation. His "Miscellanea Critica," which was published in 1745, and which has since been republished with additions, by Mr. Burgess of Oxford, "contained," says his biographer, "a collection of grammatical remarks on various Greek authors, particularly the tragedians and Aristophanes; intended as a specimen of what he meant to perform in an edition of all the Attic poets, with Homer and Pindar." Biog. Brit.

DAWES, SIR WILLIAM, a respectable prelate of the church of England, was born in the year 1671, near Braintree, in Essex. He received his grammar-learning at Merchant Taylors' school, in London, where he made a very rapid progress in the learned languages; and in 1687 he was elected scholar of St. John's college, Oxford, of which society he was, in two years, made fellow. As soon as he succeeded to his father's title and estate, he left Oxford, and entered himself a nobleman in Catharine-hall, Cambridge, where he took his degree of M.A. Being at this time too young to obtain holy orders, he spent some time in visiting different parts of his native country; and when he attained to the age of twenty-five he was ordained deacon and priest, and, by the royal mandate, created doctor in divinity, in order to be qualified for the mastership of Catherine-hall, to which he was unanimously called, in 1696. To this college he was afterwards a liberal benefactor. In the same year he was appointed chaplain in ordinary to the king, and vice-chancellor of the university. Sir William was, in the year 1698, collated to the rectory and deanery of Bocking, in Essex, where he obtained the respect and affectionate regards of all classes of the people. After the accession of queen Anne, sir William was appointed her chaplain, and became a favourite at court, and would have been made bishop of Lincoln, in 1705, but for the interference of some persons who had taken offence at a sermon which he had preached on the 30th of January. But in two years after he was appointed to the bishopric of Chester; and in 1713 to the archbishopric of York, in which he continued, an ornament to his profession, till the year 1724, when he died, full of honour and esteem. He was reckoned the most popular preacher of the day. His works were collected, and published in 3 vols. 8vo. 1733; to which is prefixed a life of the author. Biog. Brit.

DAWFUSKEE, in *Geography*, an island on the coast of South Carolina, which forms the N.E. side of the entrance of Savannah river, and S.W. side of the entrance of Broad-river, and admits of an inland communication between the two rivers.

DAWIDGRODEK, a town of Lithuania, in the palatinate of Brzesc; 56 miles E. of Brzesc.

DAWLISH, called in domesday-book *Doulis*, is a delightful maritime village in the county of Devon, England. The name is derived from its situation, *Dol-is*, a compound word, signifying, a fruitful mead in a pleasing dell. On the land side, it is nearly surrounded by lofty hills of varied features; and on the eastern side, the sea, with the bold over-hanging cliffs, furnishes striking effect to its romantic scenery. Dawlish formerly was an inconsiderable place, merely a cove, and inhabited by a few fishermen; but since sea bathing has become fashionable, it has risen into consequence, as a respectable watering-place. For the accommodation of the visitors, a handsome row of buildings has lately been erected on the strand, and numbers of houses in various parts of the village. This part of the English coast is not only inviting by its pleasing scenery, but also much esteemed for the salubrity and mild temperature of the air.

About one mile west from Dawlish is Luscombe-house, the seat of Charles Hoare, esq. This is an elegant modern mansion, erected from designs by Mr. Nash, architect, who has endeavoured to unite in the plan, the convenient and comfortable, with the beautiful and picturesque. The grounds surrounding the house consist of a succession of hill and dale; to the west appears the steep acclivity of Haldon-hill; to the east, the tower of Dawlish church; and in the distant view, the foaming waters of the English channel. Beauties of England and Wales, vol. iv.

DAX, or anciently, *Acqs*, *Aquæ Tarbellicæ*, a very ancient town of France, chief place of a district of the same name in the department of the Landes, situated on the left shore of the Adour, 30 miles N.E. of Bayonne, as many S. by W. of Bourdeaux, 42 of Aire, and 564 S. by W. of Paris. It was, in old times, the principal city of the Tarbellians, a nation celebrated among the Aquitanians; but there is not a vestige remaining of its antique splendour, except a large and deep bason in the middle of the place, constantly filled with smoking and almost boiling water, which forms a rivulet that flows into the Adour.

Until the 8th of April 1802, Dax was the see of a bishop under the archbishop of Bourdeaux. It has now a sub-prefect, two courts of justice, and a register-office, and is one of the 84 maritime districts.

Dax is chiefly remarkable for its numerous mineral springs, the four most famed of which are on the west side of the town; three serve for bathing, and the fourth for drinking. The water is clear, pellucid, almost tasteless, and so hot that it raises the thermometer to 56 degrees. According to Mr. Sécondat's analysis, the water of Dax contains only a very small quantity of muriat and sulphat of lime; and it appears certain that its efficacy is less to be attributed to the saline matters which it contains than to its natural heat, which it preserves for a long time. The water of Dax ought therefore to be used at the spring, or soon after it has come from

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the ſpring. It is preſcribed in caſes of rheumatiſm and gout, and is then uſed both externally and internally.

Dax contains 4398 inhabitants; its canton has an extent of 380 kiliometres, 25 communes, and a population of 13,991 individuals. The whole diſtrict reckons 8 cantons, 112 communes, a territorial extent of 2415 kiliometres, and 77,796 inhabitants. It produces corn, wine, and wood. Its principal trade is in deals, roſin, tar, wheat, wine, and brandy. Herbin. Statiſtique de la France.

DAXABON, DAJABON, or *Dababon*, called by the French *Laxabon*, a town and ſettlement of Spaniards, on the line between the French and Spaniſh diviſions of the iſland of St. Domingo. It was ſettled to prevent ſmuggling when the Spaniards had their ſhare of the iſlands. It is bounded E. by the territory of St. Yago, N. by the extremity of the bed of the great Yaqui and the bay of Mancenilla, and W. by the river and little iſland of Maſſacre. It contains about 4000 perſons. The town is ſituated 400 fathoms from the E. bank of Maſſacre river, more than 80 leagues N.W. of St. Domingo, and 28 W. of St. Yago. N. lat. 19° 32′. W. long. from Paris 74° 9′.

DAXBERG, a town of Germany in the archduchy of Auſtria; 2 miles W. of Efferding.

DAXENBACH, or TAXENBACH, a ſmall town of Germany in the grand duchy of Saltzburg, with an old caſtle on the river Saltza.

DAXIMONILIS, in *Ancient Geography*, a country of Pontus, ſituated towards the weſt, and watered by the river Seylax.

DAY, or BAY, in *Architecture*, one of the lights or compartments between mullion and mullion, in the great windows of the pointed ſtyle of architecture. The Saxons and early Normans built plain arched windows of a moderate proportion, as to height and width, without any mullions. But when the pointed arch was introduced, about the reign of Henry II., and the windows became long and narrow, in the form of a lancet, it was ſoon found neceſſary to place two of them together, in order to tranſmit a ſufficient quantity of light. This ſuggeſted the ſingle mullioned window with two days or bays to it. This form ſoon gave way in the larger windows to double mullions, with three days; and as architecture enlarged its dimenſions and multiplied its ornaments, particularly in the grand eaſtern and weſtern windows of cathedrals, we afterwards find theſe conſtructed with five, ſeven, and even nine principal compartments, together with an infinity of tracery-work, quatrefoils, catharine-wheels, and other ornaments. At length, in the time of Henry VIII. and his children, architects returned to the point from which they had firſt ſet out, and built plain windows without any ſtriking ornaments or diviſions.

DAY, in *Aſtronomy*, a portion of time equal to that which elapſes between two ſucceſſive tranſits of the ſun over the meridian.

The word day, in the ordinary language of ſociety, is often uſed in contradiſtinction to night, without any very accurate limit being affixed to either.

Aſtronomers likewiſe conſider the day in both theſe ſignifications, but endeavour to define the term more exactly.

The *aſtronomical or ſolar day* is the interval included between two ſucceſſive noons: Noon being defined, the preciſe moment when the centre of the ſun is on the meridian. This interval has been moſt uſually adopted by civilized nations, as the true length of the day.

The aſtronomical day begins at noon, and the 24 hours into which it is divided are counted on to the following noon; but the civil day uſed by us begins at midnight, and the twelve hours are repeated twice over. Thus February 10th, 19^h reckoned aſtronomically is, according to the mode adopted in ſociety, Feb. 11th, 7^h.

From the earlieſt times men have exerted their invention to imitate and ſubdivide this period by mechanical contrivances; and ſo unexpectedly fertile have been the reſources of human ingenuity, that the original model has been ſurpaſſed in regularity, and aſtronomers have been obliged again to have recourſe to nature, to find a more uniform ſtandard to which our chronometers ſhould be referred; the aſtronomical or ſolar arc days of unequal length, being longer about the ſeaſon of the ſolſtices than at the equinoxes.

The *mean ſolar day* is a period not marked out by the return of any obſervable phenomena, but an artificial interval of time diveſted of the above irregularities. This is effected by ſuppoſing the year divided into as many days as it really conſiſts of, but each of theſe days of an equal length. One of theſe imaginary days is called a mean ſolar day.

The accumulated difference of time that ariſes from adopting one of theſe meaſures in preference to the other is called the equation of time. For a more full account of the nature of this equation, ſee that article.

Sidereal day is a period much uſed by aſtronomers, and is that in which the earth makes one entire revolution on its axis. Here the ſtandard afforded by nature exceeds in exactneſs any imitation that can be produced by art. Hitherto at leaſt we have had no indication from aſtronomical obſervation of any irregularity in the earth's diurnal rotation; and as theory ſuggeſts none, we uſually make it the ſtandard to which we refer all other uniform motions.

Should there exiſt, however, any minute variation in the earth's revolution on its axis, it is by no means impoſſible that clocks may be brought to ſuch a degree of perfection as to detect it.

The ſolar day is longer than the ſiderial by about four minutes. This difference ariſes from the motion of the earth in its orbit.

For if on any day the centre of the ſun and a ſtar ſhould paſs the meridian at the ſame moment, the following day, when the ſtar paſſes and completes by its paſſage a ſiderial day, the ſun will appear to have moved to the eaſtward, and will not paſs the meridian till about four minutes after the ſtar. The mean difference between a ſolar and ſiderial day is $= 3' \, 56''$, but this is continually varying, its maximum being $= 4' \, 10''$, and its minimum $= 3' \, 35''$. Four times in a year the days are of their mean length. Twice a year they increaſe to a maximum, and twice a year are at their minimum: for example:

In this preſent year, 1808, the ſolar day is equal to the mean day on the 11th Feb.: it continues to decreaſe till the 25th March, when it becomes 20″ ſhorter than the mean day; from this period it begins to increaſe, and on the 14th May it equals the mean day, and continually increaſes till the 21ſt June. From the 21ſt June it decreaſes till the 14th September, the mean length taking place on the 27th July. From this time it increaſes till the 22d Dec., when its length is a maximum. From Dec. they continue to diminiſh till the following March, when nearly the ſame variations again take place. Two cauſes, independent of each other, contribute to produce this irregularity in the exceſs of the ſolar above the ſiderial day, and conſequently in the total length of the day. One of theſe is the unequal motion of the earth in its orbit; the other, the inclination of the earth's axis to the plane of its orbit.

About the period of the ſummer ſolſtice, the earth is in its aphelion, and moves ſlower than at any other ſeaſon of the year. The ſolar day therefore differs leſs from a ſiderial day; for if the earth was ſtationary, they would be equal. And

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if the earth moved in a contrary direction, the sidireal day would exceed the solar day.

On the contrary, in the month of January, the earth being in that part of its orbit nearest the sun, moves quicker, and the excess of the solar above the siderial day is greater.

To explain the effect of the second cause, it must be observed that this excess of the solar or astronomical day is measured, by reducing the apparent motion of the sun in the ecliptic to the equator, on which circle we always measure the angular motion of the earth round its axis.

If we imagine two great circles of the sphere to pass through the small arc of the ecliptic, which the sun describes in one day, and through the poles; the arc of the equator which they intercept will be the daily motion of the sun reduced to the equator, and the time required for this arc to pass the meridian is the excess of the solar above the siderial day. Now at the equinoxes this small arc of the equator will be less than the corresponding arc of the ecliptic in the ratio of the cosine of the obliquity of the ecliptic to radius; but at the solstices it is greater in the ratio of the radius to the same obliquity. The solar day is therefore diminished in the first case, and augmented in the second. The method of calculating the precise effect of these inequalities will be given in the article EQUATION *of Time*.

To obtain a mean day independent of these causes, we may suppose a second sun moving uniformly along the ecliptic, and traversing the greater axis of the ellipse, at the same instant with the true sun: this supposition will cause the inequality arising from the proper motion of the sun to disappear. The inequality arising from the obliquity of the ecliptic may be likewise removed by imagining a third sun, passing the equinoxes at the same moment as the second, and moving in the equator in such a manner that the angular distances of these two suns from the point of the vernal equinox shall always be equal. The interval of time, which would elapse between two successive transits of this last imaginary sun over the meridian, constitutes a mean solar day.

Mean time is measured by the number of these imaginary transits. True time by the transits of the real sun.

The unequal length of the days and nights in different climates, or in the same climate at different seasons, is another effect of the inclination of the earth's axis to the plane of its orbit.

If the ecliptic coincided with the equator, the circle bounding light and darkness would always divide the equator and all its parallels into two equal parts, and there would be equal day and night every where throughout the year. But by the inclination of the axis, the equator alone remains bisected as before, and all the other circles unequally divided except on the day of the equinox. After which, one pole with its adjacent circles will be gradually plunged into total obscurity, and the opposite pole with its circles brought out into constant light.

At the solstices the portion of total obscurity, and constant illumination, will extend from the poles a number of degrees equal to the obliquity of the ecliptic.

The length of the day in any latitude, at any season, may be found by the solution of a right angled spherical triangle, in which the distance of the sun from the pole, and the altitude of the pole above the horizon, form the two known sides, and a portion of the horizon the other. The angle required is the semidiurnal arc or hour angle, formed by the meridian and a great circle passing through the poles and the centre of the rising or setting sun.

This is shewn (*Plate* V. *Astron. fig.* 43.) In the right angled triangle P ⊙ O, the polar distance of the sun P ⊙, and the latitude of the place, P O, are given. The angle required ⊙ P O, or more properly its complement Z P ⊙, is the semidiurnal arc, or the time elapsed from sun-rise to noon, or from noon to sun-set.

Nations have differed much from each other as to the commencement, and still more in the division of the day. The Chaldæans, Syrians, Persians, and Indians began the day at sun-rise, and divided both the day and night into four parts. This division of the day into quarters was in use long before the invention of hours. The Chinese, who begin their day at midnight and reckon to the midnight following, divide this interval into 12 hours, each equal to two of ours, and distinguished by a name and particular figure. The Romans called the time between the rising and setting sun, the natural day, and the time in the whole four and twenty hours the civil day, and this definition has been adopted in modern Europe. They began and ended their civil day at midnight, and derived this practice from their ancient jurisprudence, and rites of religion, established long before they had any idea of the division into hours. According to Varro, the first sun-dial seen at Rome was brought from Catana in Sicily, in the first Punic war, as part of the spoils of that city. It was erected unskilfully in the forum, and though it probably was not adapted to the latitude of the place, yet it was the only measure of hours they had for near a century afterwards. Thus it appears that the Romans learnt the division of the day into hours from a dial of Greek construction. The Greeks divided the natural day into 12 hours, a practice, which according to Herodotus, they derived from the Babylonians. These hours were of course unequal at different seasons of the year, varying in the same proportion as the length of the natural day.

Such were the hours of Polybius in the time of the Roman republic, and of Plutarch and other Greek authors, under the emperors; and such they continued at Constantinople, when the western empire was no more. Palladius, "de re rustica," gives the husbandman a calendar of hours, and teaches him to distinguish them in every month of the year, by the length of a shadow projected by a perpendicular pole. This shadow decreases from the first to the sixth hour, when it is shortest; it then increases again. At the first hour in the morning and the eleventh in the afternoon he makes it always equal. Thus when Pliny directs that apples in autumn should not be gathered, *Ante horam primam* (Nat. Hist. lib. xv. cap. xviii.) he means till they have had an hour's sun upon them. The nocturnal hours were reckoned in the same manner as those of the day. Midnight was the sixth hour of the night. It appears from a passage in Varro, that an officer called accensus, used, by order of the prætor, to proclaim the third hour, mid-day, and the ninth hour. These divisions of the natural day into four parts were called vigils, the first beginning at sun rise, the second at the third hour, the third at mid-day, and the fourth at the ninth hour. The night was in the same manner divided into four vigils. And throughout the Turkish empire at this day, time is reckoned by certain portions of the natural day, resembling the vigils of the ancient Jews and Romans. Public clocks not being in use, these divisions of time are proclaimed from the minarets. Their principal division of the natural day is into four parts, which are unequal at different seasons, and in different parts of the empire.

There can be no doubt but that men of science among the ancients were acquainted with equal hours. Pliny calls them equinoxial hours. These were used in astronomical calculations, for computing the length of the day in different climates and seasons. In Egypt likewise the day was divided into unequal hours. Ptolemy marks the time of the same phenomenon, by these as well as equa hours, to accommodate

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his writings to the ufage of his country. The clock invented by Ctefibius (a celebrated mechanic of Alexandria, who lived 136 years before Chrift) was fo contrived as to lengthen or fhorten the hours. About the thirteenth century, a more regular divifion of the day into equal hours was introduced into Italy. The civil day was made to begin about the clofe of evening twilight, and 24 equal hours are counted regularly on to the fame time on the following evening. This mode is continued in many parts of Germany and Italy to this day. The clocks are ufually only numbered to, and ftrike fix, making four revolutions in one day. This method is very inconvenient, as noon and the various offices of civil life occur perpetually at a different hour, fo that a perfon muft confult an almanac to know the hour of dinner. The accumulated error which the clocks are liable to, from this unfkilful mode of computation, is corrected when it amounts to a quarter of an hour. To enable the people to regulate their domeftic concerns, a calendar is publifhed, which announces, for inftance, that from the 16th of Feb. to the 24th, it will be noon at a quarter paft 18. That from the 1ft of June to the 13th of July, it will be noon at 16. But the Italians are now gradually adopting the more improved method which has fo long been practifed in France, England, and the other enlightened countries of the north of Europe.

The only difference that at prefent fubfifts in England and France relative to the divifion of the day is, that with us, we reckon by mean time. In France they ufe folar time. Our clocks fometimes ftrike twelve when the fun is more than a quarter of an hour from the meridian. In France, the clocks ftrike twelve at the moment of noon.

The French aftronomers have lately propofed, that the aftronomical day fhould commence with the civil day at midnight.

The names which have been appropriated to different days of the week in modern Europe, have been originally tranfmitted to us by the Romans: but the Northern nations have made fome alteration, by fubftituting for the Roman divinities, fuch of their own as moft nearly refembled them in their peculiar attributes. Thus the third day of the week, confecrated by the Romans to Mars, was named from the Scandinavian deity Tyr. In the Danifh and Swedifh language it is Tyrfdag, from whence our Tuefday. Tyr was an inferior deity, but prefided over battles: and Tacitus renders the name Tyr by that of Mars, and makes him inferior to Odin, whom he defcribes under the name of Mercury.

From this Odin, or Wodin, we derive Wednefday, anfwering to dies Mercurii. Thurfday is the day of the great god Thor, the moft formidable of the Northern deities. The goddefs Freya, from whom we derive our Friday, bears a ftill greater refemblance to Venus; and fo ftriking is the analogy, that fome authors have confidered it as more than probable that the mythology of the barbarous nations of the North had a common origin with that of the Greeks and Romans.

Day, Thomas, in *Biography*, an Englifh writer of confiderable merit, was born at London in 1748. His father dying while he was an infant, the care of his education devolved wholly upon his mother, a woman of ftrong fenfe, and a found and highly cultivated judgment, to whom our author was much indebted for that manly independence and benevolent fpirit which he exhibited in every fituation of life. He received the elementary parts of his education at the Charter-houfe, from whence he removed to Corpus-Chrifti college, Oxford. In 1765, he entered at the Middle Temple, and ftudied the law fufficiently to be called to the bar. After this he fpent fome years in foreign travel, rather with a view of ftudying men and manners, than of examining the countries in a topographical view. The fruit of his refearches into the condition of his fellow creatures, excited in him fentiments of wretchednefs bordering upon melancholy: but the ftrength of his mind, and the excellent impreffions left by a good education, enabled him to overcome the languor into which he was falling, and he became the determined foe of tyranny in every fhape, and the zealous advocate and patron of the rights of men. In 1778, he married Mifs Milnes of Wakefield, a lady poffeffed of a fine underftanding, and, at the fame time, capable of conforming to the peculiarities of Mr. Day. He refided, firft at Stapleford Abbots in Effex, and afterwards he took a farm near Chertfey in Surrey, in which he employed many of the neighbouring poor in experimental proceffes. About the year 1780, he became the public opponent to the American war, the principal of which he had always abhorred; and he took a zealous part with thofe who were contending for parliamentary reform, which he confidered as the foundation of thofe other political reforms which were thought by a very refpectable body of the people to be effential to the exiftence of the country. About this period, he publifhed many political pieces in profe and in verfe, all of which were anonymous, but they pointed out the author as an ardent friend to civil liberty, and as abhorrent to the principles of flavery in every quarter of the globe. But Mr. Day's name will be long dear to the young, and to thofe who have the charge of education devolved upon them, by his "Hiftory of Sandford and Merton," in three volumes; and his "Hiftory of Little Jack," in one fmall volume. The former of thefe works powerfully inculcates all the manly virtues of courage, activity, temperance, independence, and generofity, and contains many ufeful inftructions in the principles of fcience. The moral of the ftory of Little Jack, which is entertaining, and difplays the good effects of activity, induftry, fobriety, and honefty, is, that it is of very little confequence how a man comes into the world, provided he behaves well, and difcharges his duty when he is in it.

In the midft of his endeavours to do good, and to promote the interefts of his fellow creatures, Mr. Day was cut off by an unfortunate accident. As he was riding from his own to his mother's houfe, on Sept. 28, 1789, he was killed by a fall from his horfe, being only in the 42d year of his age.

In private life Mr. Day was a faithful and tender hufband, an affectionate fon, and a generous and fympathizing friend. He was remarkably plain in his drefs: in the choice of his food, he was far from being nice and delicate, not, however, from the want of a very difcriminating tafte, but becaufe he had obferved that a faftidioufnefs of appetite is often productive of evil confequences. His mode of travelling was as fimple and unexpenfive as poffible; the reafon he affigned for which was, that the lefs he fpent upon himfelf, the more he could afford for the wants of his fellow creatures. In confequence of the wide range of his charity, and the unoftentatious manner in which it was beftowed, many of his beneficent actions are now totally unknown. Few returned from him empty-handed, for he faid that "he loved to give." But the private character of Mr. Day fhall be given in the words of his widow: "The undeviating firmnefs, independence, and difinterneftednefs of Mr. Day's character, in an age of fuch venality, corruption, and effeminacy as the prefent, might furely be confidered as a fingular phenomenon. As I, of all human beings, was the moft intimately acquainted with the extraordinary and invariable fimplicity of his life and manners, I do not fcruple

to say that this, united to his patriotic spirit (with the opinion I entertained of his eloquence and ability), continually reminded me of those great and virtuous characters of ancient times, who, despising the common objects of ambition, cultivated their farms, and yet were ever ready, when occasion called, to exert themselves in defence of the rights and liberties of their country. My husband's conduct was in a great measure conformable to that sentiment of Rousseau, "while there is one of our fellow creatures who wants the necessaries of life, what virtuous man will riot in its superfluities." Dr. Kippis, in the Biographia Britannica, has given an interesting analysis of the works of Mr. Day, to which the reader must be referred for information on this head. "If Mr. Day's life had been continued," says his excellent biographer, "he would undoubtedly have exerted his talents in farther productions for the benefit of mankind. But though his premature death must ever be regretted, his surviving friends will have the consolation of reflecting that he lived long enough to exhibit a pattern of disinterested virtue and ardent philanthropy, which, it is hoped, cannot be useless to the world."

DAY, JOHN, the first printer of music in England upon five lines. Before the reformation, the canto fermo in the missals, breviaries, &c. of the Roman church, had been printed on four lines in Gregorian notes, very soon after the invention of the press; but no prickt discant, or figurative music, was published till the first year of queen Elizabeth, when a choral work appeared, "**Certaine notes set forth in foure and three partes, to be song at the Morning Communion, and Evening Praier, very necessarie for the Church of Christe to be frequented and used: and unto them be added divers Godly Praiers and Psalmes, in the like forme, to the honour and praise of God. Imprinted at London, over Aldersgate, beneath St. Martins, by John Day**, 1560. The authors of these compositions were Tallis, Cawston, Johnson, Oakland, Shepherd, and Taverner.

DAY, in *Law*, is frequently used for the day of appearance in court, either originally, or upon assignation. There is a day of appearance in court by the *writ* and by the *roll*; by *writ*, when the sheriff returns the writ; by *roll*, when he hath a day by the roll, and the sheriff returns not the writ, there the defendant, to save his freehold, and prevent loss of issues, imprisonment, &c. may appear by the day he hath by the roll. (Co. Litt. 135.) In real actions there are *dies communes*, common days; and in all summonses there must be 15 days after the summons, before the appearance; and before the statute of "Articuli super Chartas," in all summonses and attachments in plea of land, there should be contained 15 days. (Co. Litt. 134.) As to offences in B. R., if the offence be committed in another county than where the court sits, and the indictment be removed by *certiorari*, there must be 15 days between every process and the return thereof; but if it be committed in the same county where the bench sits, they may sit *de die in diem*; but this they will very rarely do. (Ibid.) There is a day called *dies specialis*, as in an assise in the king's bench or common pleas, the attachment need not be 15 days before the appearance, otherwise it is before justices assigned; but generally in assises the judges may give a special day at their pleasure, and are not bound to the common days; and these days they may give as well out of term as within. There is also a day of grace, *dies gratiæ*; and generally this is granted by the court at the prayer of the demandant or plaintiff, in whose delay it is; but it is never granted where the king is party, by *aid prier* of the tenant or defendant; nor where any lord of parliament, or peer of the realm, is tenant or defendant. And sometimes the day that is *quarto die post*, is called *dies gratiæ*, for the very day of return is the day in law, and to that day the judgment hath relation, but no default shall be recorded till the fourth day be past; unless it be in a writ of right, where the law alloweth no day but the day of the return. Co. Litt. 135.

There are several *return days* in the terms; and if either of them happen upon a Sunday, the day following is taken instead of it: for Sunday is *dies non juridicus*: and so is Ascension day in Easter term, St. John the Baptist in Trinity term, All Saints and All Souls in Michaelmas term, and the Purification of the Virgin Mary in Hilary term. 2 Inst. 264.

If a fact be done in the night, you must say in law proceedings, *nocte ejusdem diei*.

To be dismissed *without day* is to be finally dismissed the court; and when the justices before whom causes were depending, do not come on the day to which they were continued, whether such absence be occasioned by death or otherwise, they are said to be *put without day*; and may be received, or re-considered by re-summons, re-attachment, &c. (See stat. 1 Ed. VI. c. 7.) Also, by the common-law, all proceedings upon any indictment, &c. whereon no judgment had been given, were determined by the demise of the king, and nothing remained but the indictment, original writ, &c., which were *put without day*, till re-continued by re-attachment to bring in the defendants to plead *de novo*; though this is remedied by stat. 4 and 5 W. III. c. 18. 1 Ann. c. 8.; by which such process, &c are to continue in the same force after the king's demise, as they would have done if he had lived.

In action of trespass, if the day laid in the declaration be either *before* or *after* the actual day on which the trespass is committed, it is not material, if a trespass be proved. (Co. Litt. 283, *a*.) But the day laid must be before the first day of that term of which the declaration is entitled; or if the trespass be committed within the term, there must be a special memorandum of some particular day (if by bill), or of some general return-day (if in C. P. or B. R. by original writ), *subsequent* to the day wherein the trespass was committed; and so as to other actions where the cause of action arises *within* the term. Jacob's Law-Dictionary by Tomlins.

DAY-*Coal*, in *Natural History*, a name given by the miners of England, and the common people who live in coal countries, to that seam or stratum of the coal which lies uppermost in the earth. The same vein or stratum of coal usually runs a great way through the country, and dips and rises in the earth in different places; so that this upper stratum, or day-coal, is, in the various parts of the same stratum, sometimes near the surface, and sometimes at many fathoms deep. The subterranean fires found in some of our coal countries principally feed on this coal, and are nearer, or farther from the surface, as it rises or sinks. Phil. Trans. N° 130.

DAY-*Labourer*, in *Agriculture*, a person who works by the day.

DAY-*Light*, in *Law*. In respect to day-light, before sun-rising, and after sun-setting, is accounted part of the day, by common law; as to robberies committed in the day-time, when the hundred is liable. 7 Rep. 6.

The law regularly rejects all fractions and divisions of a day, for the uncertainty. 5 Rep. 1. 1 Inst. 135.

DAY *Lily*, in *Botany*. See HEMEROCALLIS.

DAY *Rule*, in *Law*. See DAY *Writ*, *infra*.

DAY-*Work*, in *Rural Economy*, such work as is performed by the day.

Day's-*Work*, in *Sea Language*, denotes the reckoning or account of the ſhip's courſe, during twenty-four hours, or between noon and noon, according to the rules of trigonometry. See Dead-*reckoning*.

Day-*Writ*, or Day *rule*, in *Law*, a rule or order of court, permitting a priſoner in cuſtody in the king's bench priſon, &c. to go without the bounds of his priſon for *one day*. By rule of the court of king's bench, Eaſter, 30 Geo. III. a priſoner ſhall not have day-rules, above three days in each term, and he is to return to priſon before nine in the evening. The king may grant "writ of warrantia diei" to any perſon, who ſhall ſave his default for *one day*, be it in plea of land or other action, and be the cauſe true or not; and this by his prerogative. (Br. Prerogative, pl. 142, cites F. N. B. 7.) It is againſt law to grant liberty to "priſoners in execution," by other writs than day-writs or rules. (Chan. Rep. 67.) No priſoner, committed by B. R., ought to have the benefit of the day-rule of going abroad in term-time; for their impriſonment is their puniſhment for their contempt or miſbehaviour. (2 Show. 88. pl. 80.)

Days *in Bank*, are days ſet down by ſtatute, or order of the court, when writs ſhall be returned, or when the party ſhall appear on the writ ſerved. See ſtat. 51 H. III. ſtat. 2 and 3. 32 Hen. VIII. c. 21. 16 Car. I. c. 6. 24 Geo. II. c. 48. And by the ſtatute "De anno biſſextili," (21 H. III.) the day increaſing in the leap-year, and the day next going before, are to be accounted but one day.

It is commonly ſaid, that the day of Niſi Prius, and the day in the Bank, are one day; but this is to be underſtood as to pleading, and not to other purpoſes. (1 Inſt. 135.) But after iſſue found for the plaintiff at the Niſi Prius, if a day be given in Bank, and the defendant makes default, judgment ſhall be given againſt him. (2. Danv. Ab. 477.)

Days *of Grace*. See Day.

Days *of Grace*, in *Commerce*, are a number of days allowed by cuſtom for the payment of a bill of exchange after the ſame becomes due; *i. e.* after the time it was accepted for is expired.

In England, three *days of grace* are allowed: ſo that a bill accepted, in order to be paid, *e. gr.* ten days after ſight, is not to be paid till thirteen days. Throughout France, they allow ten *days of grace*; as many at Dantzic; eight at Naples; ſix at Venice, Amſterdam, Rotterdam, and Antwerp; four at Frankfort; five at Leipſic; twelve at Hamburgh; eight at Copenhagen; three at Berlin; ſix in Portugal; fourteen in Spain; thirty in Genoa, &c. Note, Sundays and holidays are included in the number of *days of grace*.

Days-*Man* is uſed, in ſome parts of England, for an arbitrator or judge: and it has been obſerved, that the word *day* ſignifies judgment.

Days *of Prefixion*. See Remembrancer.

Days, *Fiſh*. See Abstinence.

Days, *Dog*, *Dies caniculares*. See Canicular.

Days, *Critical*, *Dies critici*. See Critical *days*.

Days, *Intercalary*, *additional*. See Intercalary *days*.

DAYA, in *Geography*, a town ſituated on the weſt coaſt of the iſland of Sumatra, on a river of the ſame name; 30 miles S. of Acheen.

DAYMAR, a town of Arabia, in the country of Omar: 220 miles S. of Maſcat.

DAYTON, a ſmall ſettlement of America, in the ſtate of Ohio, and county of Montgomery.

DEA, in *Geography*, a town of Perſia, in the province of Segeſtan, 60 miles S. W. of Kin.

Dea *Vocontiorum*, *Die*, in *Ancient Geography*, a town of Gallia Viennenſis, which belonged to the Vocontians.

DEABAGEN, in *Geography*, a town of Aſia, in the country of Candahar; 30 miles N. W. of Candahar.

DEACON, *Diaconus*, in *Eccleſiaſtical Hiſtory*, a perſon who belonged to the inferior order of miniſters in the Chriſtian church.

The word is formed from the Latin *diaconus*, of the Greek διακονος, *miniſter*, *ſervant*.

Deacons were firſt inſtituted, ſeven in number, by the apoſtles, Acts, chap. vi. which number was retained a long time in ſeveral churches. Grotius apprehends that the order of deacons in the Chriſtian church correſponded to that of eleemoſynaries in the Jewiſh ſynagogue. Their office was, to ſerve in the agapæ, and to diſtribute the bread and wine to the communicants, and diſpenſe the alms.

Their original inſtitution was to *ſerve tables*, which office included the care of the poor, and an attendance at the Lord's table. As for the care of the poor, Origen tells us (Comment. in Matt. tom. 16, p. 443, vol. 1.) that the "deacons diſpenſed to them the money of the church," being employed under the biſhop to inſpect and relieve all the indigent within their dioceſe; and as for their attendance at the Lord's table, their office, with reſpect to that, conſiſted in preparing the bread and wine, in cleanſing the ſacramental cup, and other ſuch neceſſary things, whence they are called by Ignatius (Epiſt. ad Tralles. p. 48.) "deacons of meats and cups," aſſiſting alſo, in ſome places at leaſt, the biſhops or preſbyters in the celebration of the euchariſt, "delivering the elements to the communicants." (Juſt. Mart. Apolog. 2. p. 97.) Tertullian informs us, (De Bapt. p. 602.) that the deacons preached, and, "in the abſence of the biſhops and preſbyters, baptized." In a word they were, according to the ſignification of their name, and as Ignatius calls them (ubi ſupra) "the ſervants of the churches," ſet apart on purpoſe to ſerve God, and attend on their buſineſs, being conſtituted, as Euſebius terms it, (lib. ii. cap. 1.) "for the ſervice of the public." King's Conſt., &c. of the primitive Church, p. 80.

The office of deacon was, at its firſt inſtitution, a truſt in things merely temporal, or what Jerom called "the ſervice of tables and widows." They were no other than what, in modern language, we ſhould call the church's almoners. Nor is it any objection, as Dr. Campbell ſuggeſts (Lect. on Eccleſiaſtical Hiſtory, vol. i. p. 245.) that we find both Stephen and Philip, who were among the ſeven deacons that were firſt preſented by the people to the apoſtles, exerciſing ſpiritual functions, ſuch as preaching and baptizing. This power they certainly did not derive from the ſuperintendency of the people's charities, to which alone they were choſen, with which they were entruſted, and which the apoſtles, in the very inſtitution of the office, expreſsly diſtinguiſh from the miniſtry of the word. (Acts, vi. 1—4.) Here the διακονια τραπεζων, and the διακονια λογυ, are manifeſtly contraſted to each other. Stephen and Philip, on the contrary, derived their ſpiritual functions, either from that title, with which, according to Tertullian and the deacon Hilarius, every qualified perſon, in that ſtate of the church, was inveſted for promoting the common cauſe, or from the ſupernatural gifts they had received for the advancement of the faith, before their election to the deaconry, or, as ſome have thought moſt probable, from their being called of God to the office of evangeliſts. Philip is in another place, but at a later period, expreſsly called an evangeliſt. (Acts, xxi. 8.) It is worthy of notice, that his office of deacon is there alſo named, that we may not confound them, or aſcribe to the one what belonged to the other.

other. Soon after the apoftolic age, (or perhaps fooner,) though we have no direct information concerning it, the deacons were admitted to affift in the inferior parts of the facred fervice. At prefent, indeed, in almoft a l the churches, where the three orders of bifhop, prefbyter, and deacon are found, the laft-mentioned has no fort of charge in that particular, which was at firft his whole charge, and which alone gave occafion for the inftitution of the office; infomuch that we cannot fay the modern deacon is in any refpect the fame with the apoftolic deacon, unlefs it be in the name. Properly the original charge of the inftitution, of which we are informed in Acts vi. 1, is abolifhed, though the name be retained, and applied to an office totally diftinct. At prefent the overfight of the poor belongs, in England, to the church-wardens, who are annually elected in each parifh by the veftry. The deacons have no concern in it. In other churches, other methods are adopted.

By the ancient canons, marriage was not incompatible with the ftate and miniftry of a deacon; but it is now a long time that the Romifh church has prohibited their marrying; and the pope only grants them difpenfations for very important caufes; and, after this difpenfation, they lofe the rank and functions of their order, and return to a lay ftate.

At Rome, under pope Sylvefter, they had only one deacon; then feven were appointed; then fourteen; and, at laft, eighteen; who were called cardinal deacons, to diftinguifh them from thofe of other churches.

Their office was, to take care of the temporalities of the church, to look to the rents and charities, and provide for the neceffities of the ecclefiaftics, and even of the pope. The collecting of the rents, alms, &c. belonged to the fubdeacons; the deacons were the depofitaries and diftributors. Having thus the management of the revenues of the church in their hands, their authority grew apace, as the riches of the church increafed. Thofe of Rome, as being minifters of the firft church, preceded all others, and even at length took place of the priefts themfelves. Doubtlefs, it was the avarice of the priefts that made them give place to the deacons, who had the difpofal of the money.

The deacons rehearfed certain prayers at the holy office, which were thence denominated *diaconical*.

They took care that the people at church behaved themfelves with due modefty and refpect. They were not allowed to teach publicly; at leaft not in the prefence of a bifhop or prieft. They only inftructed the catechumens, and prepared them for baptifm. The doors of the church were likewife in their cuftody; though, in after-times, that charge was committed to the fubdeacons.

Thefe fubdeacons are mentioned both by Cyprian, (Epift. 24.) and Cornelius, (apud Eufeb. l. vi. c. 43.) As the office of the prefbyters was to affift and help the bifhops, fo theirs was to affift and help the deacons. And as the prefbyters, fays lord King, (Conft. &c. of the Primitive Church, p. 81.) were of the fame order with the bifhop, (fee Bishop) fo probably the fubdeacons were of the fame order with the deacons, which we may infer from the origin and rife of thefe fubdeacons, which might be this, that in no church whatfoever was it ufual to have more than feven deacons, becaufe that was the original number inftituted by the apoftles; and, therefore, when any church became fo great and numerous, that this limited number of deacons was not fufficient to difcharge their neceffary miniftrations, that they might not feem to deviate from the apoftolical example, they added affiftants to the deacons, whom they called fubdeacons or under-deacons, who were employed by the head or chief deacons to perform thofe fervices in their room, to which, by their office, they were obliged.

The office of a deacon, in the church of England, according to the form of ordination, is to baptize, preach, and affift in the adminiftration of the Lord's fupper; and, in fhort, to perform all the other offices in the liturgy, which a prieft can do, except that of confecrating the elements of the Lord's fupper, and pronouncing the abfolution. No perfon can be ordained a deacon under the age of twenty-three years, unlefs by a faculty or difpenfation obtained from the archbifhop of Canterbury: and in order to this, he muft be provided with a title to a cure, or be a fellow or chaplain in fome college in Cambridge or Oxford, or a mafter of arts of five years ftanding, living at his own charge in either of the univerfities, or be admitted by the bifhop, who ordains him to fome benefice or curacy then void. Otherwife the ordaining bifhop fhall maintain him, till he is preferred to fome ecclefiaftical living. And by ftat. 13 and 14 Car. II. c. 4. no perfon is capable of being admitted to any benefice or ecclefiaftical promotion, till he be ordained a prieft; nor is a deacon capable of a donative, but is only allowed to ufe his orders as a chaplain to fome family, a curate to fome prieft, or a lecturer without a title.

DEACONESS, *Diaconiffa*, an office probably of apoftolic inftitution, though we have no information concerning the occafion and manner of it, in ufe in the primitive church, from the times of the apoftles, though now laid afide. St. Paul makes mention of it in his Epiftle to the Romans, (Rom. xvi. 1.): and the younger Pliny, in a letter to Trajan, tells that prince, that he had ordered two deaconeffes, whom he calls miniftræ, to be tortured.

Deaconefs was a title given to certain devout elderly women, commonly widows, who confecrated themfelves to the fervice of the church, and rendered thofe offices to the women, which men could not decently do: as in baptifm, for inftance, which was conferred, by immerfion, on women as well as men.

They were likewife to look to the doors on the fide the women were on, who were feparated from the men, according to the cuftom of thofe times. They had the care and infpection of the poor, fick, &c. And in times of perfecution, when a deacon could not be fent to the women, to exhort and fortify them, a deaconefs was fent. See Balfamon on the eleventh canon of the council of Laodicea; and the Apoftolical Conftitutions, lib. ii. cap. 57. To fay nothing of the epiftle of Ignatius to the people of Antioch; where what is faid of deaconeffes is fuppofed to be an interpolation.

The council of Nice ranks deaconeffes among the clergy, though fome hold, that their ordination was not facramental, but a mere ecclefiaftical ceremony. However, it gave them a pre-eminence above the reft of their fex; for which reafon the council of Laodicea forbad the ordaining of any more for the future. The office of deaconeffes expired in the Weftern church about the twelfth century, and in the Eaftern about the thirteenth.

Atto of Verceil, in his eighth letter, gives the reafon of their being abolifhed: he obferves, that in the firft ages the miniftry of women was neceffary, in order to the more eafy inftructing of other women, and recovering them from paganifm; and that they likewife ferved for the more decent adminiftration of baptifm to the fame: but that it was not then neceffary, becaufe none but children were baptized; and it might now be added, becaufe baptifm is only conferred by fprinkling.

The number of deaconeffes does not feem to have been fixed;

fixed: the emperor Heraclius, in his letter to Sergius, patriarch of Conſtantinople, orders, that in the great church of Conſtantinople there be forty deaconeſſes; whereas there were only ſix in that of the Mother of God, in the quarter of the Blachernœ.

DEACONRY, DIACONATE, the order or miniſtry of a deacon or deaconeſs. See DEACON, and DEACONESS.

DEACONRY, *Diaconia*, is alſo a name ſtill reſerved to the chapels and oratories in Rome, under the direction of the ſeveral deacons, in their reſpective regions or quarters.

To the deaconries were annexed a ſort of hoſpitals, or board, for the diſtribution of alms, governed by the regionary deacons, called cardinal deacons, of whom there were ſeven, anſwering to the ſeven regions, their chief being called the arch-deacon.

The hoſpital adjoining to the church of the deaconry, had an adminiſtrator for the temporal concerns, called the father of the deaconry, who was ſometimes a prieſt, and ſometimes a layman.

There were fourteen of theſe deaconries, or hoſpitals at Rome, which was reſerved to the cardinals. Du Cange gives us their names: as the deaconry of St. Maria in the Broad-way, the deaconry of St. Euſtachio near the Pantheon, &c.

DEAD, in *Geography*, a river of South Wales, which runs into the Nevern near Newport, in the county of Pembroke.

DEAD-BEAT *Eſcapement*, in *Horology*, conſiſts of a ſwing-wheel and pallets, ſo peculiarly conſtructed, that the hand inſerted on the arbor of the ſwing-wheel, called the ſeconds hand, remains motionleſs, or, as it were, dead, during the remainder of the pendulum's vibration, after the eſcape has taken place. It had been obſerved, that thoſe pallets which check the natural vibrations of the pendulum, and produce a backward motion of the ſeconds' hand at every vibration, called a recoil, occaſion a clock to gain time when any addition is made to the maintaining power, and the contrary; or, which is the ſame thing, that a clock with ſuch pallets will loſe time by becoming dirty. The celebrated Graham, therefore, contrived that conſtruction of the pallets and ſwing-wheel, which conſtitute the dead-beat eſcapement, with a view of obviating this defect in clock-work, which indeed it does in a great meaſure, though a ſmaller oppoſite defect is thereby produced, *i. e.* with the common dead-beat eſcapement, an addition to the maintaining power produces a retardation in the rate, and conſequently a certain quantum of acceleration is the conſequence of foulneſs in the works. We might in this place have deſcribed in detail the particulars of the dead-beat eſcapement, but that we have already referred to the article ESCAPEMENT for them, where the reader will find a deſcription of the different eſcapements; and where, from the contraſt given of the different conſtructions of the various eſcapements, he will the better comprehend their relative merits. In the mean time he may turn to the paragraph *callipering*, in the article CLOCK-*making*, and conſult *fig.* 3. of *Plate* X. of *Horology*, in the latter of which he will find a geometrical delineation of the dead-beat eſcapement for a half ſeconds pendulum, and in the former meet with a correſponding deſcription.

DEAD-*Bell*, in *Mythology*, an omen credited among the Scottiſh peaſantry, which is ſaid to be a tinkling bell in the ears, regarded by the country people as the ſecret intelligence of the deceaſe of ſome friend.

DEAD-CHEST *Iſland*, in *Geography*, one of the ſmaller Virgin iſles, ſituated near the eaſt end of Peter's iſland, and weſt of that of Cooper's.

DEAD *Lights*, in a *Ship*, are wooden ports made to faſten in the cabin windows, to prevent the waves from breaking into the ſhip in a high ſea.

DEAD-MAN'S *Bay*, in *Geography*, a bay ſituated on the eaſt ſide of Newfoundland iſland, ſouth of St. John's harbour, and N. W. of cape Spear.

DEAD-MAN'S *Head*, or *Point*, a cape of England on the coaſt of Cornwall, in the Engliſh channel. N. lat. 50° 13′. W. long. 4° 48′.

DEAD-MAN'S *Iſland*, one of the Magdalen iſlands. N. lat. 47° 22′. W. long. 61° 30′.

DEAD-MAN'S *Eyes*, or DEAD *eyes*, in *Ship-Rigging*, are round, flat, wooden blocks, with three holes, inſtead of ſheaves, through which the laniards reeve, when ſetting up the ſhrouds or ſtays. The power gained by dead-eyes is as the number of parts of the laniards reeved through them; but, if the laniards be not well-greaſed, the power will be greatly loſt by friction, ſo that they are never applied as purchaſes, but merely for the better keeping the quantity gained of any ſhroud or ſtay, when ſet up, and are much ſtronger than blocks with ſheaves, when ſtrain lies on a ſingle pin.

DEAD-*Nettle*, in *Botany*. See LAMIUM.

DEAD-*Nettle, yellow*. See GALEOPSIS.

DEAD-*Pledge*, in *Law*. See MORTGAGE.

DEAD-*Reckoning*, in *Sea Language*, is that eſtimation, judgment, or conjecture, which the ſeamen make of the place where a ſhip is, by keeping an account of her way by the log, by knowing the courſe they have ſteered by the compaſs, and by rectifying all, with allowance for drift, lee-way, &c. according to the ſhip's trim; ſo that this reckoning is without any obſervation of the ſun, moon, or ſtars, and is to be rectified as often as any good obſervation can be had. See LOG.

DEAD-*Riſing*, a term in a ſhip for that part of her bottom, through her whole length, where the floor timber is terminated upon the lower futtock.

DEAD-*Ropes*, in a ſhip, are ſuch as are not running, *i. e.* which do not run in any block.

DEAD-*Sea*, in *Geography*. See ASPHALTITE *Lake*.

DEAD-*Sea*, *Chemical Analyſis of its Waters*.—The waters of the Dead ſea, or lake Aſphaltites, have been from time immemorial remarkable for their intenſe ſaltneſs, which is ſo great that no fiſh, inſect, or any living animal is found in them, and the banks are perfectly barren. The ſame intenſe ſaltneſs alſo gives ſo great a ſpecific gravity, that the human body cannot ſink in it; diving in it is impracticable; and Pococke relates, that he could lie on its ſurface motionleſs in any attitude.

A ſpecimen of this water was analyſed by Meſſ. Macquer and Lavoiſier, the account of which was publiſhed in the Memoirs de l'Academie des Sciences for 1778; and a more careful, and therefore more accurate, analyſis has lately been made by Dr. Marcet on a ſmall portion collected by Mr. Gordon of Clunie, in his travels into Paleſtine, and tranſmitted by him to Sir J. Banks. From Dr. Marcet's analyſis (publiſhed in the Philoſophical Tranſactions for 1807, part 2.) we may give the following particulars.

The water is perfectly tranſparent and colourleſs, and does not depoſite any cryſtals on ſtanding in cloſe veſſels. Its taſte is peculiarly bitter, ſaline, and pungent. Its ſpecific gravity is as high as 1.211, which is greater that that of any other known natural water of any conſiderable extent. It is however not ſaturated with ſalt, for it will diſſolve more when added to it: it is neither acid, nor alkaline, but perfectly neutralized. By chemical teſts, the preſence of lime, magneſia, muriatic, and ſulphuric acid, are readily detected.

We ſhall not here detail the particular proceſſes by which Dr.

Dr. Marcet obtained a very satisfactory analysis of the contents of this water, but the results are the following:

A hundred grains of the water contain of

	Grains.
Muriat of lime - - - -	3.920
Muriat of magnesia - - -	10.246
Muriat of soda - - - -	10.360
Sulphat of lime - - - -	0.054
	24.580

All the salts here mentioned are estimated as in a state of thorough desiccation, or that in which no water whatever is present, except what appears essential to the constitution of the acid at a red heat. This degree of dryness, however, can only be inferred with regard to the muriats by estimation from collateral experiments; for when those are dried at 180° (above which point they lose also part of their acid), they contain about $1\frac{1}{2}$ times their weight of water. The numbers here given differ somewhat from those found by another mode of analysis, but this difference is so small as only to confirm and not invalidate the general accuracy of the experiments.

On the whole, therefore, it appears that the water of the Dead sea contains about a fourth of its weight of salts, when in perfect desiccation; and of these salts about $\frac{5}{12}$ths are common salt, and the remainder almost entirely a mixture of the muriats of lime and magnesia; the latter in by much the largest proportion.

We may add, that a small quantity of the water of the river Jordan (which is the only stream of any considerable size that terminates in the Dead sea) was also analysed by Dr. Marcet. This is a very pure soft tasteless water, remarkably different in sensible properties from that of the Dead sea; but on evaporation a minute quantity of salts were obtained, which were found to be a mixture of the same as those of the lake, but in too small proportion for analysis.

Dead-*Tops*, in *Rural Economy*, a disease incident to young trees; and cured by cutting off the dead parts close to the next good twig or shoot, and claying them over as in grafting.

Dead *Water*, is the eddy water just behind the stern of a ship. It is so called, because it does not pass away so swiftly, as the water running by her sides doth.

If a ship have a great eddy following her stern, they say, she makes much dead-water.

Dead-*Wood*, in *Naval Architecture*, a name given by shipwrights to certain blocks of timber laid upon the keel, particularly at the extremities afore and abaft, where these pieces are placed upon one another to a considerable height, because the ship is there so narrow, as not to admit of the two half-timbers, which are therefore scored into the dead-wood, where the angle of the floor-timbers greatly diminishes as approaching the stern and stern-post. The dead-wood afore and abaft is equal in depth to two thirds the depth of the keel, and as broad as it can be, without exceeding the breadth of the keel.

Dead-*Work*, denotes all that part of a ship, which is above water when she is laden.

DEADLY Carrot, in *Botany*. See Thapsia.

Deadly *Feud*, in our *Law Books*, a profession of irreconcileable enmity till a person is revenged by the death of his enemy.

The word feud is derived from the German fehd, which, as Hottoman observes, signifies, modo bellum, modo capitales inimicitias. See Feud.

Such enmity and revenge were allowed by our ancient laws in the time of the Saxons; *viz.* if any man was killed, and a pecuniary satisfaction were not made to the kindred, it was lawful for them to take up arms, and revenge themselves on the murderer; which was called deadly feud. And this, probably, was the original of an appeal.

Deadly *Nightshade*. See Atropa.

DEADS, in *Mining*, is used to express that part of the shelf or fast ground which contains no ore; but which encloses the vein or bed of the ore, like a wall on every side. The drifts which they sink for the tin ore in Cornwall, are generally about three feet over, and about seven feet high; so that a man may conveniently stand upright at work, and manage his tools. In case the vein itself is not broad enough to allow this, as in many places it is not half a foot over, then they pick down the strata that enclose it, so as to make an opening of the same breadth. This work they call breaking up the deads. Phil. Trans. N° 69.

This word is also used for such parcels of common loose mould or earth, lying above the shelf, as usually contain the shoad, which they find when they are training a load.

In the Mendip lead-mines, when a vein of ore breaks off abruptly in an earth, they call it a deading-bed; and earth without ore, they call dead-earth.

DEAF, in *Agriculture*, a term used to signify blasted or barren, as applied to grain, nuts, &c.; thus we have deaf ears, deaf nuts, &c. signifying such as are destitute of grain, kernels, &c.

DEAFFORESTED, in our *Law Books*, the being discharged from being forest: or freed and exempted from forest-laws. See Forest.

"Johannes Dei gratia, &c. archiepiscopis, episcopis, &c. sciatis nos omnino *deafforestasse* forestam de Brewood de omnibus, quæ ad forestam et forestarios pertinent. Quare volumus et firmiter præcipimus, quod prædicta foresta, et homines in illa manentes, et hæredes eorum, sint *deafforestati* in perpetuum."

DEAFNESS, in *Medicine*, imperfection or abolition of the faculty of hearing.

The causes of the loss or imperfection of hearing are numerous, as will be readily conceived by any one, who considers the complex structure of the ear: and the difficulty of distinguishing the modifications of deafness, as produced by these different causes, and consequently of curing the disease, will be not less obvious, if the obstacles, which nature has thrown in the way of such an inquiry, be also taken into consideration. The essential parts of the organization of the ear are situated within a bony case, beyond the reach of examination, and only one of the two passages, leading to it, can be brought under the eye of the observer. See Ear. The varieties of deafness have been usually treated by writers under separate heads, according to the parts of the organ, in which the causes were situated; as in the *meatus externus*, or external passage; the eustachian tube, or passage to the internal ear; and the internal ear itself.

1. *Deafness from Disease of the external Passage.*—The most common impediment to hearing that occurs in the external passage to the ear, consists in an unusual accumulation and inspissation of the cerumen, or wax of the ear, which is secreted by the glands of the passage. The quantity of cerumen, which may be collected without injuring the power of hearing, cannot be stated: it is different in different individuals, and in many persons the quantity is naturally considerable. Sometimes it has been observed plugging up the passage altogether; and sometimes forming a false membrane of the tympanum, or thickening the natural one. But in ordinary cases, where the proper consistence of the cerumen remains

remains unaltered, the functions of the organ are not much injured; whereas a small portion of hardened cerumen, lodged on the membrane of the tympanum, will deprive a person of his hearing. The symptoms connected with the hardening of the cerumen are pretty well known. The patient, besides his inability to hear, complains of noises, particularly a clash or confused sound, in mastication, and of heavy sounds like the ponderous strokes of a hammer. Where the relation of these symptoms excites a suspicion of the existence of hardened wax, the practitioner will have recourse to examination, by which he may reduce it to a certainty. Any means capable of removing the inspissated wax may be adopted; but syringing the passage with warm water is the most speedy and effectual, and the only expedient necessary.

The external passage is subject to an ulceration, which has been termed herpetic. This produces a great thickening of the integuments, and the passage is often so much closed, that a great degree of deafness ensues. The ichor, which exudes from the ulcerated surface, inspissates in the passage, and not only obstructs the entrance of sound, but is accompanied with much fœtor. This disease is not unfrequent. It generally yields to the application of solutions of the metallic salts, as of muriated mercury in lime water; or of vitriolated zinc; or to the use of the unguentum hydragyri nitratum; calomel, or other alteratives being taken at the same time. Saunders on the Ear.

Sometimes polypous excrescences occur in the external passage, and impede the hearing; or the passage is rendered narrow by the pressure of the neighbouring glands, when much swelled; and sometimes it is obstructed by the presence of extraneous substances. The causes, in the first and last instances, may be removed by mechanical means.

2. *Deafness from Obstruction of the Eustachian Tube.*—The eustachian tube is a passage leading from behind the palate to the internal cavity of the ear. By permitting a free motion of the air, contained in that cavity, during the vibration of the membrane of the tympanum, it facilitates that vibration, and consequently contributes greatly to the perfection of the faculty of hearing. Hence a very great degree of deafness is produced by an obstruction of this tube. When such an obstruction has occurred, air can no longer be admitted into the cavity of the tympanum; and the included portion either is absorbed, or it remains. In the latter case, the included air, incapable of yielding in any other way than by condensation, counterbalances the pulses excited by sounding bodies. In the former, the pressure of the atmosphere will carry the membrane of the tympanum into the tympanum, as far as it will go, in which state it will rest, and cannot vibrate in any considerable degree. Either hypothesis will account for the deafness. But it has been suggested, that, subsequently to the obliteration of the eustachian tube, the included air is absorbed, and the cavity of the tympanum filled with mucus; at least the cavity was found in this state in two instances of dissection, where the eustachian tube was closed. See Saunders on the Anatomy and Diseases of the Ear, p. 42.

The obstruction of the tube most frequently arises from syphilitic ulcers in the throat, or sloughing in the cynanche maligna. The deafness ensues on the healing of the ulcers, that is, when the obstruction is complete. The descent of a nasal polypus into the pharynx, and enlarged tonsils, have also been known to close the tube.

If the patient blows, with his nose and mouth stopped, he does not experience that peculiar sensation, which arises from the inflation of the tympanum. He speaks only of the loss of sense, and complains of no particular symptom. The deafness differs in this respect from all other species; the patient not being harassed with distressing noises, which are false perceptions, arising from a diseased state of the auditory nerves, or proceeding from real impressions on the nerves produced by morbid causes in the organ.

Generally the obstruction comes on in consequence of some notable disease in the throat, and the cartilaginous extremity of the tube is most commonly the seat of it; yet it occasionally takes place in the bony portion. It is then slower in its progress, proceeds from no obvious cause, and consists in an inordinate ossification, filling up the canal.

We are destitute of a perfect diagnostic symptom, by which we can be assured when deafness is produced by an obstruction of the eustachian tube. The incapability of inflating the tympanum only renders it probable; for many people who hear perfectly, are incapable of producing this sensation, at least in a great many trials. We are therefore compelled to trust to the patient's account. This will be sufficient when the obstruction has been preceded by an ulceration or disease of the throat.

We are indebted to the penetration of Mr. Astley Cooper, for the means of restoring the sense of hearing, which the obstruction destroys. He had observed in suppurations of the tympanum, which had injured and even destroyed the membrane of the tympanum, that the sense of hearing was only impaired, not totally lost, and that the degree of deafness, when the membrana tympani was only injured, by no means equalled that produced by the obstructed tube. Reflecting on this, he was induced to consider that a small puncture of the membrane of the tympanum would be of trivial detriment even to a sound ear, and in this instance would be the means of restoring to the organ the exercise of its functions. This happy expedient he himself executed with great success, a success fully confirmed by a similar result of the operation in the hands of others.

The operation is performed by passing an instrument into the external passage, and pushing it through the anterior and inferior part of the membrane of the tympanum. It is unnecessary to state the reason for making the puncture in this place; the position of the manubrium of the malleus evidently demands this precaution. A little crack will immediately be perceived, similar to what is occasioned by the puncture of parchment, more particularly if the tube be closed, as the sound will then be more acute, from the rapid entrance of the air through a narrow aperture. The instrument ought not to penetrate far into the tympanum, lest it should penetrate its vascular lining; as the escape of blood into the cavity would for a short time frustrate the operation, even if it should ultimately be successful.

When the puncture has been successfully made, the patient is instantaneously restored to a perfect hearing. The effect of the operation is the immediate substitution of a small hole in the membrana tympani for the eustachian tube; and air being admitted into the tympanum, the mobility of the membrane returns, and the action of the machinery of the tympanum is re-established.

The only obstacle to the complete success of this puncture is its tendency to close. For this reason, it is often necessary to make rather a large hole in the membrane, before you can insure the patient against the recurrence of the deafness. But a large hole diminishes the perfection of the sense. Tension is the state essential to the membrane of the tympanum. This tension is not diminished by a small perforation; but if the membrane be much lacerated or detached at its circumference, the tension will be lessened; yet even then the patient receives a striking benefit. To this imperfection we must however submit; and perhaps a larger opening may generally be expedient, than can be made by a simple

fimple perforation with the inftrument propofed by Mr. Cooper.

The cafes related by Mr. Cooper may be found in the Philofophical Tranfactions for 1802. See Saunders on the Ear, p. 41, *et feq.*

3. *Deafnefs from Diforders of the internal Ear.*—The nature of the deafnefs which arifes from difeafes of the internal parts of the ear is much more difficult to afcertain, than in the preceding inftances, in confequence of our inability to examine the morbid changes, which are the immediate caufe of the defect. If we reflect on the component parts of the labyrinth, we are led to conjecture that the deafnefs originates in a want of fenfibility in the nerve; in fome alteration in the ftructure of the membranes on which the nerve is expanded; or in a change in the properties of that fluid, which is contained in the membranes, and is the immediate agent in impreffing the fentient extremities of the nerve. In diffecting the ear of a perfon born deaf, Mr. Clive found that the labyrinth, inftead of its aqueous fluid, contained a thick cafeous fubftance. This muft have been incapable of undulating in the cavities of the labyrinth, and its exiftence is fully adequate to account for the total abfence of the fenfe. Examples have been mentioned by writers of hydatids in the cavities of the internal ear, and of collections of pus and blood in thofe parts, producing deafnefs; alfo of exoftofis, and other alterations of the internal ftructure of the organ, occafioned by the virus of fmall-pox, fcrofula, &c. See Portal, Anatomie Medicale, tom. iv.

But it has been afcertained by diffection, that total deafnefs may exift, without any defect in the mechanifm of the exterior parts of the ear; and without any defect in the membranous ftructure on which the nerve is expanded, in the water it contains, or in the nerve itfelf; in fhort, without any morbid appearance that can be traced by the eye. Such cafes may be confidered as examples of nervous deafnefs, dependent on fome morbid infenfibility in the nerve itfelf. The patient can inflate the tympanum, and the external paffage may be perfectly free from hardened wax; this fpecies too is accompanied with the fenfation of different noifes in the head, fuch as the murmuring of water, the ruftling of leaves, the blowing of wind, &c. Some patients complain of a beating noife, correfponding with the pulfe, increafing by bodily exertion in the fame degree as the action of the heart. The caufe of this fenfation is doubtlefs the pulfation of the arteries; although it may be difficult to explain what the change is, which renders the organ fufceptible of this impreffion; or to determine whether the fmall arteries, which ramify in the interior of the labyrinth, are the immediate agent, or the internal carotid, which paffes clofe beneath the cochlea.

The infenfibility of the auditory nerves may be occafioned by various diforders of the parts in their courfe; as by the preffure of tumours, exoftofis of membranes thickened by inflammation, by fcrofula, or fyphilis, or by mere fullnefs and over-diftenfion of the blood-veffels: hence deafnefs of this fort often precedes or accompanies apoplexy, palfy, epilepfy, phrenitis, &c. A fimilar deafnefs likewife arifes, where the organic caufe is feated in the brain, or fpinal marrow, at the origin of the auditory nerves; and fometimes in the fide oppofite to the deaf ear. See Portal Anat. Medicale—Callifen Syft. Chirurg. Hodiern. tom. ii. par. 359, and 551.

Where there are fymptoms of plethora, fuch as intimate a probable occurrence of hemiplegia, or where local inflammation in the head has preceded the deafnefs, evacuants, particularly local ones, will be reforted to; fuch as the application of blifters to the neck or behind the ears, or of leeches, or cupping glaffes, to the fame parts; and the general antiphlogiftic plan will be purfued more or lefs, according to the urgency of the plethoric fymptoms. Where thefe fymptoms are abfent, and a fufpicion of the thickening and enlargement of the neighbouring parts, in confequence of fyphilitic or fcrofulous affections, exifts, the conftitutional remedies required for thefe difeafes will be employed. And where it appears that the fenfibility of the auditory nerves is impaired from a feeble and imperfect action of the circulation, the local ftimulus of electricity, or galvanifm, may be applied; ftimulating liquids may be dropped into the external meatus, or introduced on lint, and fternutatories employed, together with the external ftimulus of veficatories and rubefacients.

Confirmed nervous deafnefs is, in truth, generally hopelefs; but it is not eafy to determine *à priori*, when attempts to cure it will be vain. This does not depend on the duration of the difeafe, but on the degree of mifchief done to the organ; and therefore the periods at which it becomes incurable muft be various. In the incipient ftate, it would appear, from feveral cafes related by Mr. Saunders, that the nervous deafnefs may be relieved by the antiphlogiftic regimen, purgatives, and bliftering. On the Anat. and Difeafes of the Ear, p. 49, *et feq.*

Another diforder of the internal ear, producing deafnefs, is a puriform difcharge from the tympanum, of an ichorous nature, fometimes tinged with blood, and imparting a yellow colour to a filver inftrument. This difeafe is attended with a lofs of hearing proportionate to the injury which the machinery of the tympanum has fuftained; and hence the fenfe is varioufly impaired, from the flighteft degree up to total deafnefs.

In general, when the patient blows ftrongly, with the nofe and mouth clofe, air will be expelled at the meatus externus. Whenever this circumftance is obferved, it is clear that the difcharge proceeds from, or is connected with, an injury or deftruction of the membrane of the tympanum; but the reverfe by no means proves that the membrana tympani is found, and the difcharge therefore confined to the external paffage. For it often occurs, that the fame inflammation, which terminates in a fuppuration of the tympanum, previoufly obliterates the euftachian tube, which remains permanently clofed after the ceffation of the inflammation that occafioned it. The ftate of the tympanum, therefore, muft be afcertained by actual examination. The ear muft be infpected in a ftrong light. For this purpofe the patient fhould be placed in fuch a pofition, that the rays of the fun may fall into the meatus, and illuminate it fufficiently to make the bottom vifible: or the ear may be founded with a blunt probe, and any perfon acquainted with the particular feel of the membrana tympani, may eafily diftinguifh it by the touch. If the membrane be defective, the inftrument will pafs into the tympanum, the bony fuperfices of which is ftill more diftinguifhable. He, therefore, who will inftitute a proper examination, cannot fail of arriving at a certain knowledge of this difeafe, and will not confound it with the herpetic ulcerous ftate of the meatus externus, before mentioned. In the latter fuccefs is certain, and as foon as the ulceration is cured, hearing is perfectly reftored; but in the former, however perfectly the difcharge may be fuppreffed, the event is very dubious.

This ftate of the tympanum is produced by various caufes. In the fcarlatina maligna, inflammation of the tympanum attacks the patient, and advances to gangrene: if he furvives the fever, the machinery of the ear often floughs fo extenfively, that the membrana tympani and the whole chain of bones are evacuated, and the patient is perfectly deaf. Moft commonly this difeafe fucceeds the ear-ache, which is, in fact, an acute inflammation of the tympanum. If the inflammation fhould not fubfide fpontaneoufly, or be affuaged by art, the tympanum and maftoid cells form a large quan-

tity of pus. After the patient has fuffered the moft intenfe pain, the membrane of the tympanum ulcerates, and the pus is difcharged at once in a large quantity. He is then greatly relieved, but the difeafe ceafes not; the parts fupply frefh matter, which continually oozes out at the meatus.

The fymptoms produced by inflammation of the tympanum are, moft intenfe pain of the head and ear, a great degree of fymptomatic fever, and fometimes flight delirium. This pain fluctuates, and its paroxyfms refemble the toothache; a refemblance which has unfortunately caufed it to be wholly neglected, or very improperly treated. The cafe obvioufly requires the moft active antiphlogiftic treatment, and the abfence of every thing ftimulative. But the oppofite practice prevails. The moft acrid applications and fpirituous liquors are the general means employed for the relief of the patient; an error that unqueftionably tends to produce the worft cataftrophe that can happen, *viz.* the fuppuration of the parts. This difeafe, however, is not always the refult of one acute attack of inflammation: moft frequently it is flower and more infidious in its progrefs. Slight paroxyfms of pain attack the patient, and are relieved by flight difcharges. Thefe recur at intervals, until at laft the puriform difcharge is fully confirmed.

This difeafe demands attention, as it is very deftructive in its tendency to the faculty of hearing, fince it rarely ftops, till it has diforganized the tympanum. For the puriform difcharge naturally advances to ulceration, and ulceration to denudation and caries of the bone, and feparation of the chain of bones: a caries of the tympanum is therefore ultimately produced. Yet it is unaccountable that many writers and practitioners affert the propriety of abftaining from all attempts to ftop this difcharge, from a notion that the fuppreffion of it might be injurious. But the fact is, the puriform difcharge from the tympanum often exifts without a caries of the bone, and antecedently to this is moft commonly curable.

Mr. Saunders confiders this difeafe as exifting under three ftates or ftages: 1. a fimple puriform difcharge; 2. a puriform difcharge, complicated with fungi and polypi; 3. a puriform difcharge with a caries of the tympanum. The time neceffary to accomplifh the tranfition from one ftage to another is uncertain. Years do not affect it in fome inftances; and, in others, it feems to advance almoft at once to a carious ftate of the bone.

The puriform difcharge from the tympanum is a local difeafe, and does not depend on any difordered ftate of the conftitution: general remedies are therefore inefficacious. But as a bad ftate of health is unfavourable to the healing of any parts, fo, in this particular complaint, any difordered condition of the habit fhould be corrected. The chief dependence is to be placed on direct applications to the parts affected. Injections of vitriolated zinc, acetite of lead, &c. are very efficacious in fuppreffing the difcharge; and their effects may be aided by the external employment of blifters and fetons. The fungous and polypous excrefcences muft be removed or deftroyed by mechanical means; they are only incidental occurrences, and their removal reduces the difeafe to the firft ftage.

As it has been ftated that the degree of deafnefs produced by this complaint is various; fo, when it is cured, the fenfe is reftored in different degrees. For the deafnefs during its continuance is fometimes very confiderable, when the real injury which the organ has fuftained is trivial. In the firft ftage, the mere thickening of parts, or the collection of the difcharge, muft impede the action of the intervening machinery between the external and internal parts of the ear: and, in the fecond, the mechanical obftruction of the fungufes or polypi excludes the pulfes of the air. On this account there is often a notable increafe of the power of hearing, when the difcharge is fuppreffed in the firft and fecond ftages. But as the parts are invifible, it is difficult, if not impracticable, to decide *à priori* how far the power of hearing can be reftored. Now this is no valid objection to attempting the cure. The fenfe will not be rendered worfe by a failure; and, if the difcharge fhould be ftopped, the difeafe which caufed it is removed, the organ fafe from farther injury, and the patient freed from an offenfive malady. In the laft ftage, the fenfe is almoft, if not totally, deftroyed; and although the difcharge be ftopped, the patient's hearing will be very little, if at all, improved.

After the cure of this difeafe, the tympanum is expofed to the free ingrefs and egrefs of the air, and the mucilaginous difcharge infpiffates, as the mucus of the nofe, by the exhalation of its watery parts. By this accident the patient's deafnefs increafes at intervals, for which he often feeks relief. The practitioner, on founding the ear, perceives this hardened matter; and conceiving, as is really the cafe, that it produces the augmentation of deafnefs, is tempted to remove it. But nothing ftimulative, nor any rude attempts can be fafe, for there is great danger of reproducing the difcharge. Having learned that a difcharge has pre-exifted, it will be expedient to leave it to a fpontaneous feparation. Saunder's Anat. and Dif. of the Ear.

Deafnefs often occurs in the courfe of acute fevers, in confequence, perhaps, of the lofs of power in the nervous fyftem, which fucceeds the violence of febrile excitement. Experience has decided, that this deafnefs is a favourable fymptom, confidered with a view to the prognofis in fever, and that it generally ceafes as the ftrength is reftored.

The deafnefs common in old age depends upon the condition of the nerves and folids, which conftitutes the decline of the conftitution; for in this ftate the folids become rigid, and unfit for delicate movements, and the fenfibility of the nerves is greatly diminifhed. Of courfe it is incurable.

Thofe who are born deaf continue, through life, deprived of the faculty of fpeech; as it is impoffible they fhould learn to imitate founds which they cannot hear. Much ingenuity and induftry, however, have been exerted, and that with confiderable fuccefs, in ennabling thefe unhappy beings to communicate their thoughts to each other. See DUMBNESS.

In the year 1792, an "afylum for the fupport and education of the deaf and dumb children of the poor," was inftituted in London, which has afforded relief to a confiderable number of thefe very compaffionable objects. This fociety is under the direction and management of a prefident, 14 vice-prefidents, a treafurer, and a committee of 23 governors. The children, who are admitted between the age of 9 and 14 years, are taught to fpeak and write articulately, and to underftand what they read and fpeak; they are taught penmanfhip, and practical arithmetic, fo as to fit them for the management of common concerns; and they are alfo taught fome of the moft ufeful mechanical arts, by which they are enabled to earn a livelihood.

Thofe born deaf are alfo dumb, as not being able to learn any language, at leaft in the common way. However, as the eyes, in fome meafure, ferve them for ears, they may underftand what is faid by obferving the motion of the lips, tongue, &c. of the fpeaker; and even accuftom themfelves to move their own, as they fee other people do; and by this means learn to fpeak.

Thus it was that Dr. Wallis taught two young gentlemen, born deaf, to know what was faid to them, and to return pertinent anfwers. Digby gives us another inftance of the fame, within his own knowledge. And there was a Swifs phyfician formerly living at Amfterdam, one Joh. Conrad

Conrad Amman, who effected the fame in feveral children born deaf, with furprifing fuccefs. He has reduced his fcheme to a fixed art, or method, which he has publifhed in his Surdens Loquens, Amftelod, 1692, and De Loquela, ibid. 1700.

In the Philofoph. Tranf. N° 312. we have an account by Mr. Waller, R. S. Sec. of a man and his fifter, each about fifty years old, born in the fame town with Mr. Waller, who had neither of them the leaft fenfe of hearing; yet both of them knew, by the motion of the lips only, whatever was faid to them, and would anfwer pertinently to the queftion propofed. It feems they could both hear and fpeak when children, but loft their fenfe afterwards; whence they retained their fpeech, which, though uncouth, was yet intelligible.

Such another inftance is that of Mr. Goddy's daughter, minifter of St. Gervas in Geneva, related by bifhop Burnet. At two years old they perceived fhe had, in great part, loft her hearing; and ever after, though fhe heard great noifes, yet fhe could hear nothing of what was faid to her. But by obferving the motions of the mouths and lips of others, fhe had acquired fo many words, that out of thefe fhe had formed a fort of jargon, in which fhe could hold converfation whole days with thofe that could fpeak her language. She knew nothing that was faid to her, unlefs fhe faw the motion of the mouths of thofe that fpoke to her; fo that, in the night, they were obliged to light candles to fpeak to her. One thing will appear the ftrangeft part of the whole narration: fhe had a fifter, with whom fhe had practifed her language more than with any body elfe; and in the night, by laying her hand on her fifter's mouth, fhe could perceive by that what fhe faid, and fo could difcourfe with her in the dark. Burn. Let. iv. p. 248.

It is obfervable that deaf perfons, and feveral others thick of hearing, hear better and more eafily, if a loud noife be raifed at the time when you fpeak to them, which is owing, no doubt, to the greater tenfion of the ear-drum on that occafion. Dr. Willis mentions a deaf woman, who, if a drum were beat in the room, could hear any thing very clearly; fo that her hufband hired a drummer for a fervant that by his means he might hold converfation with his wife. The fame author mentions another, who, living near a fteeple, could always hear very well, if there was a ringing of three or four bells; but never elfe.

Dr. Buchner relates an extraordinary method of making deaf perfons to hear, by applying thin flips of wood, about fix feet long, an inch broad, and as thick as the back of a knife, at one end to the upper teeth of the fpeaker, and at the other to the upper teeth of the deaf perfon. Many trials were made to afcertain the fact, and the voice was found perceptible and diftinct. This method, he obferves, may be adapted to all perfons afflicted with deafnefs, provided the auditory nerves are not injured or deftroyed at their origin. See Buchner's Eafy and Practicable Method to enable deaf Perfons to hear, tranflated from the German, 1770. For a further account of the deaf and dumb, and of the methods ufed for the relief of fuch perfons, fee Dumbness.

A man who is born deaf, dumb, and blind, is regarded by the law in the fame ftate as an idiot; being fuppofed incapable of any undertaking, as wanting all thofe fenfes which furnifh the mind with ideas. A man who could neither fpeak nor hear, committed felony and was arraigned, and therefore committed to prifon. A perfon, having made his will, became ill and loft his fpeech: the fame will was delivered into his hands, and it was faid to him, that he fhould deliver it to the vicar, if it fhould be his laft will, or otherwife retain it: he delivered it to the vicar, and it was held a good will. When a defendant appeared by oath, to be both fenfelefs and dumb, fo that he could not inftruct his counfel to draw his anfwer, it was ordered that no attachment, or other procefs of contempt, fhould be awarded againft him for not anfwering, without fpecial order of the court. One that is deaf cannot give; and thus alfo, one that is dumb. However, according to the opinion of fome, they may confent by figns; but it is generally held, that a dumb perfon cannot make a gift, becaufe he cannot confent to it. (1 Inft. 107.) The lord fhall have the cuftody of a copyholder that is deaf and dumb; for elfe he fhall be prejudiced in his rents and fervices; and adjudged for the grantee of the lord againft the prochain amy of the copyholder. Cro. Jac. 105.

A perfon born deaf and dumb, who fignified by figns that fhe underftood what fhe was about to do, was allowed to levy a fine of lands; by Bridgman, Ch. J. and other juftices. Cart. 53.

DEAL, is a well-known kind of wood of great ufe. In its common ftate, for ordinary purpofes, it confifts of planks of fir, fawed from the trunk of the tree longitudinally, of various thickneffes, according to the ufes to which they are applied.

A very good method of feafoning planks of deal, is to throw them into falt-water as foon as they are fawed, and keep them there three or four days, frequently turning them. In this cafe they will be rendered much harder, by drying afterwards in the air and fun; but neither this nor any other means yet known, will preferve them from fhrinking.

Deals are imported chiefly from Chriftiania, and other parts of Norway; from Dantzic, and feveral parts of Pruffia; from Peterfburg, Archangel, and other parts of Ruffia. They are fold by the piece, or ftandard hundred, or long hundred of 120. A ftandard, or reduced deal, is $1\frac{1}{2}$ inch thich, 11 inches wide, and 12 feet in length.

Rods of deal expand laterally, or acrofs the grain, in moift weather, and contract again in dry; and thence have been found to make an ufeful hygrometer. Phil. Tranf. N° 480. p. 184. See Hygrometer.

Deal, in *Geography*, is a market and fea-port town in the hundred of Cornilo, and lathe of St. Auguftine, in the county of Kent, England. It is diftant 18 miles from Canterbury, and $73\frac{3}{4}$ S.E. from London. The town ftands on the fea-fhore, which here forms a bold beach; and is defended from the violence of the waves by a long rampart of pebbles, which have been thrown up by the fea. The parifh is recorded in the domefday book under the name of Addelam. In the time of Henry VI. it was, by the king's letters patent, configned, together with Walmer, to the jurifdiction of the Cinque Ports. At that time it was governed by a deputy and affiftants, appointed by the mayor and jurats of Sandwich. This mode continued till the eleventh year of William III., A.D. 1699, when the people fucceeded in obtaining a charter; by which Deal was conftituted "a free town and borough of itfelf, and its local government vefted in a mayor, twelve jurats, twenty-four common-council-men, a recorder, town clerk, and other inferior officers. Nothing, however, appears in this charter to have abrogated the prefcriptive rights of Sandwich, in fome inftances, refpecting Deal. The former has a concurrent jurifdiction with the latter; and the inhabitants of Deal are liable to ferve on juries at Sandwich. In the time of Leland, this place did not rank as a town; it was, according to that author, no more than a fmall "fifher village, half a myle fro the fhore of the fea," inhabited by a few perfons employed in fifhing, whofe houfes conftitute that part of the town called Upper Deal. What is

is termed Lower Deal received a great increafe in extent of buildings and population, about the commencement of the laft century. It is now a confiderable maritime town, confifting of three long ftreets, running parallel with the fea, and connected by others more or lefs narrow; which, as is common in fea-ports, render them both incommodious and dirty. The houfes are irregularly built, principally of brick; but in thofe erected within a few years, greater attention has been paid to uniformity. Since the year 1790, when an act was obtained for paving, lighting, and cleanfing the town, it has undergone various improvements; and convenient regulations have been made for the accommodation of perfons vifiting the place during the bathing feafon. The mother-church being found too fmall, and inconveniently diftant, a chapel of eafe was erected in the lower town by fubfcription, in the year 1707. The caftle, which ftands to the fouth of the town, is furrounded by a deep fofs, croffed by a draw-bridge. It confifts chiefly of a round tower, containing apartments for the officers and garrifon who attend the battery. But the principal defence of this place is derived from the martello towers, and other batteries which have been lately erected along the coaft in the vicinity. In the town is a regular cuftom houfe, at a little diftance from which is a naval ftore-houfe. Here are alfo an extenfive naval and military hofpital, and a large houfe of induftry. The fea immediately oppofite the town is called the Downs, which has become a general rendezvous for fhipping, both men of war, as well as merchant veffels. This has contributed greatly to the increafe of Deal. In time of war, the immenfe influx of people, and the conftant demand for fhip-ftores, tackling, provifions, clothes, and various other neceffary articles, render this town an eligible fituation for perfons in trade. But the principal inhabitants are employed in maritime occupations, and fome few are engaged in fmuggling. The channel called the Downs is about eight miles long and fix broad; and the depth varies from eight to twelve fathoms. This is the common rendezvous of the Eaft India and other fleets on their voyages, both when homeward and outward bound. In particular ftates of wind, nearly 400 fail of fhipping have been feen at one time, fafely riding at anchor here. For the more fafe conveyance of veffels in and out of the Downs, and up the river Thames and Medway, an eftablifhment of pilots is formed at this port, under an act of parliament. They are divided into two claffes, called the upper and lower book. The former confifts of twenty-four pilots, five of whom are conftituted wardens; and the latter, of twenty-five. The charges of pilotage are regulated by the tonnage. Thofe of the upper book have the privilege to pilot fhips drawing more than eleven feet four inches. To this book, thofe of the lower progreffively rife by feniority. Attached to thefe is a fet of experienced and intrepid feamen, who make it their particular bufinefs to afford affiftance to fhips in diftrefs. They are called Hovellers. During a ftorm, when the wind feems to baffle all human fkill, and nothing but inftant deftruction is expected by the labouring veffels; two or more hovelling boats will be frequently feen riding upon the bofom of the wave, as if in defiance of the contending elements. Numerous are the inftances in which the brave crews of thefe apparently infignificant veffels, have been fuccefsful in refcuing thoufands from the moft imminent peril.

According to Gale, Horfley, and fome other antiquaries, the place of Cæfar's firft landing in Britain was at Rutupiæ, the prefent Richborough; but Camden, and the authors of the Beauties of England and Wales, conclude that it muft have been near Deal. After mentioning the advantageous pofition the Britons had taken on the heights of Dover, and convinced of the folly of attempting a landing there, Cæfar ftates, in his Commentaries, which contain his own account of his campaigns, "Dato figno et fublatis anchoris circiter millium paffuum vii., ab eo loco progreffus aperto, et plano littore naves conftituit;" *i. e.* having made a fignal, weighed anchor, and failed eight miles further up, he brought to his fhips on a plain and open fhore. A defcription which agrees with the coaft near Deal, for it is the firft low fhore to the north of Dover; and fome entrenchments, ftill to be traced, are fuppofed the fite of his maritime camp. At this place Perkin Warbeck landed from France, when he perfonated the duke of York, under which title he laid claim to the crown of England.

The amount of the population of Deal, as returned under the late act, was 5420, and the number of houfes 917. By the charter of king William, two weekly markets are held on Tuefdays and Wednefdays, and two annual fairs. Hafted's Hift. of Kent. Beauties of England and Wales.

The Goodwin fands, called by Hector Boethius, "Navium gurges & vorago, a moft dreadful gulf and fhip-fwallower;" though they ferve as a kind of natural pier, and form the fouthern boundary of the Downs, are frequently fatal to fhips coming from the eaftward; as the waves break over them in boifterous winds with unabating fury. Thefe fands extend about ten miles in length, from what is termed the northfand-head, being nearly oppofite to Ramfgate: and the fouthfand-head, to Kingfdown. Tradition has reprefented thefe fands as once an ifland, which belonged to the great earl Godwin, and that it fuddenly funk, and was fwallowed by the fea, as a fignal mark of divine vengeance on the heinous fins of that nobleman. But from Gyraldus' account and that of Hector Boethius, the event appears to have more naturally happened about the end of the reign of William Rufus, or beginning of Henry the I.'s, and was occafioned by one of thofe fudden inundations, which, from fome latent caufes, not unfrequently happen in the ocean; whereby the ftate of its ebbings and flowings is confiderably changed upon different coafts. Hiftory informs us, fuch a phenomenon took place on the coafts of Flanders, whereby a large tract of country was overflowed; and, at the fame time, a fimilar injury, though not to an equal extent, was done on the fhores of England and Scotland. The prefent ftate of the ancient Portus Rutupenfis, and of Sandwich haven, afford ftriking evidence of the fea having formerly flowed much higher than it does at prefent on this part of the coaft. The danger of ftriking on the fands is defcribed by Mr. Seaton to arife from their nature, which is that of a "quickfand, clean and unconnected;" yet lying fo clofe, as to render it difficult to work a pointed bar to the depth of more than fix or feven feet. At low water they are dry in many parts, and parties frequently land on them; but when the tide begins to flow, the fand becomes foft and quick, and their ingurgiting power is fo great, that the largeft veffel driven upon them would, in a fhort time, be completely fwallowed up. To prevent fuch accidents, the corporation of the Trinity-houfe intended to have erected a light-houfe upon thefe fands; but no foundation being obtained by boring, the defign was laid afide. A floating light has been placed on the eaft fide of the north fand-head, which has proved highly beneficial. Beauties of England and Wales, vol. viii. Perambulation of Kent. Hiftorical Report of Ramfgate Harbour.

About one mile fouth of Deal is fituated Walmer, at the commencement of the high fand, which extends from hence to the cliffs at Dover. The village is commonly called Walmer-ftreet, and confifts of good houfes, inhabited by refpectable families. Walmer caftle ftands at a fhort diftance from the village, nearly clofe on the fea fhore; and commands, from its windows, a beautiful view of the Downs,

Downs, and the coaſt of France. This fortreſs is appropriated for the reſidence of the Warden of the Cinque-ports; and for this purpoſe, a few years ago, the principal apartments were handſomely fitted up for Mr. Pitt, on his temporary retirement from the chancellorſhip of the exchequer.

Deal, a town of America, in the ſtate of New Jerſey, and county of Monmouth, 7 miles S. of Shrewſbury, to which the inhabitants of Philadelphia reſort, in ſummer, for health and pleaſure.

DEAMBULATORY, or Ambulacrum, from *deambulo*, a lobby or portico for walking in, anciently very common in thoſe hoſpitals or other ſimilar buildings which were not furniſhed with regular cloiſters. One of theſe deambulatories, in length half a furlong, is to be ſeen on the eaſt ſide of the hoſpital of St. Croſs, near Wincheſter.

DE AMICIS, Anna, in *Biography*, an exquiſite female Italian ſinger and actreſs, arrived in England in the autumn of 1762, with her family, all engaged for the comic opera, but all in ſubordinate parts, except herſelf, who was appointed firſt woman, to ſupply the place of the Paganini.

The opera-houſe opened this ſeaſon, Nov. 18th, with the comic opera of "Il Tutore e la Pupilla," a paſticcio, in which Anna De Amicis captivated the public in various ways. Her figure and geſtures were in the higheſt degree elegant and graceful; her countenance, though not perfectly beautiful, was extremely high-bred and intereſting; and her voice, and manner of ſinging, exquiſitely poliſhed and ſweet. She had not a motion that did not charm the eye, or a tone but what delighted the ear. Indeed, ſhe acted and ſung for the whole family; for by her merits, and good works, ſhe covered the multitude of their ſins, which would otherwiſe have had no remiſſion.

In Jan. 1763, a new comic paſticcio was brought on the ſtage, called "La Caſcina," and in February, another comic opera, compoſed by Galuppi, called "La Calamita de' Cuori," which had in it ſome charming airs, that ſeem to have been originally intended for the diſplay of all the enchanting powers of the young Anna De Amicis. Of this burletta, as well as the preceding, the elegant and intereſting De Amicis was the chief ſupport. The reſt of the ſinging was ſo deſpicable, that only her ſongs have been printed.

This admirable performer, on her return to Italy, in 1764, was engaged at Milan, as firſt ſerious woman, in which character ſhe ſung at the minor theatres of Italy with univerſal admiration, till 1773, when ſhe was again called to Milan, previouſly to her departure to Peterſburg, whither ſhe went in 1774. In 1775 ſhe was engaged at Naples, and in 1776 we find her ſinging in the ſame city, with Pacchierotti, under the name of De Amicis Buonſolazzo, probably the name of her huſband. And from this time ſhe ſeems to have regarded Naples as her home; as, except once at Turin with Aprile, in 1777, and the next year at Bologna with Tibaldi, we hear of her nowhere elſe, and her private conduct ſeems to have been equally correct with her public; as no irregularities have ever arrived at our knowledge to ſully her profeſſional fame and amiable character.

DEA Nettle, a name provincially applied to the weed, wild hemp.

DEAN, a prime dignitary in moſt cathedral and collegiate churches; being uſually the preſident of the chapter.

He is called dean, decanus, of the Greek δεκα, *ten*, as being ſuppoſed to preſide over ten canons or prebendaries, at leaſt.

Canoniſts diſtinguiſh between deans of cathedral, and thoſe of collegiate churches. The firſt, with their chapter, are regularly ſubject to the juriſdiction of the biſhop. As to deans of collegiate churches, they have uſually the contentious juriſdiction in themſelves, that is, they exerciſe juriſdiction over their canons in all civil or criminal matters; though ſometimes this belongs to them in common with the chapter.

In England, as there are two foundations of cathedral and collegiate churches, the old and the new (the latter being thoſe founded by Henry VIII. on the ſuppreſſion of the abbots and priors, when their convents were turned into dean and chapter); ſo there are two ways of creating the deans. Thoſe of the old foundation, as the deans of St. Paul's, York, &c. are raiſed to their dignity much like a biſhop; the king firſt ſending out his conge d'elire to the chapter; the chapter then chooſing, the king yielding his royal aſſent, and the biſhop confirming him, and giving his mandate to inſtal him. Thoſe of the new foundation, as the deans of Canterbury, Durham, Ely, Norwich, Wincheſter, &c. are donative, and are inſtalled by a ſhorter courſe; only by the king's letters patent, without either election or confirmation, and are viſitable only by the lord chancellor, or by ſpecial commiſſion from the king; but the letters patent are preſented to the biſhop for inſtitution, and a mandate for inſtallment goes forth. 1 Inſt. 95. Davis, 46, 47. The new deaneries and chapters to old biſhoprics are eight; *viz.* Canterbury, Norwich, Wincheſter, Durham, Ely, Rocheſter, Worceſter, and Carliſle. The new deaneries and chapters to new biſhoprics are five; Peterborough, Cheſter, Glouceſter, Briſtol, and Oxford.

Deaneries and prebends may become void, like a biſhopric, by death, by deprivation, or by reſignation to either the king or the biſhop. If a dean, prebendary, or other ſpiritual perſon, be made a biſhop, all the preferments of which he was before poſſeſſed are void; and the king may preſent to them in right of his prerogative royal. But they are not void by the election, but only by the conſecration.

There are ſome cathedral churches which never had a dean; as thoſe of St. David and Landaff, where the biſhop is the head of the chapter, and in his abſence the archdeacon. The biſhop is deemed "quaſi decanus," and has, it is ſaid, both an epiſcopal throne and a deaconal ſtall allotted to him in the choir. St. Aſaph and Bangor, the two other Welſh cathedrals, have the dignity of dean diſtinct from that of biſhop; but the patronage of both deaneries is in the reſpective biſhops, theſe being neither elective by the chapter, nor donative in the crown. 1 Inſt. 95. In Ireland the king appoints to deaneries as to biſhoprics, by letters patent. *Id. ib.*

Conſtantine, we are told, erected an office of nine hundred and fifty perſons at Conſtantinople, taken out of divers trades and profeſſions, whom he exempted from all impoſitions, and beſtowed them on the cathedral church, to render the offices of burial gratis to the defunct, particularly to the poor. Theſe he called decani and lecticarii, probably becauſe they were divided by tens, each whereof had a bier, or a litter, to carry the bodies in. It is ſuppoſed to be thoſe who, under Conſtantius, began to be called copiatæ; *i. e.* clerks deſtined for labour; for they are uſually ranked among the clerks, and even before the chantors. By a law of the year 357, it appears that there were ſome of theſe copiatæ at Rome.

Dean is alſo a title applied among us to divers perſons that are the chiefs of ſome peculiar churches, or chapels; as, the dean of the king's chapel, who has no juriſdiction; of the arches, who has juriſdiction only; of Battel, in Suſſex, founded by William I. who hath cure of ſouls, and juriſdiction within the liberty of Battel, is preſentable by the duke of Montagu, and inſtituted and inducted by the biſhop of Chicheſter, but not ſubject to his viſitation: of Bocking, in Eſſex, who hath a court and juriſdiction to hold plea of all eccleſiaſtical matters ariſing in ſeveral pariſhes within his peculiar,

peculiar, and is conftituted by commiffion from the archbifhop of Canterbury, like the dean of Arches, and of Croydon in Surrey. There are alfo deputy-deans and commendatory-deans, who cannot confirm any grants, &c.

A commendatory dean may, with the chapter, choofe a bifhop; and if a dean be elected bifhop, and before confecration obtains difpenfation to hold his deanery *in commendam*, fuch dean may well confirm, &c. for h s old title remains, and therefore confirmations, and other acts done by him as dean, are good in law. Latch. 237. 250. Pa m. Rep. 460. A deanery is a fpiritual dignity, and therefore a man cannot be dean and prebendary in the fame church. Dyer, 273.

Deans of colleges in our univerfities are officers appointed to fuperintend the behaviour of the members, and to enforce difcipline. Some are called deans of provinces, or deans of bifhops: thus, the bifhop of London is dean of the province of Canterbury; and to him, as fuch, the archbifhop fends his mandate for fummoning the bifhops of his province, when a convocation is to be affembl*y*d, which may perhaps account for his being called dean of the bifhops. Deans are divided, from the nature of their office, into deans of fpiritual promotions, and deans of lay promotions. Of the former kind are deans of peculiars, with cure of fouls, deans of the royal chapels, deans of chapters, and perhaps rural deans. Of the latter kind are deans of peculiars, without cure of fouls, who may be, and frequently are, perfons not in holy orders.

Deans, with regard to the manner of their appointment, are elective, fuch as deans of chapters of the old foundation, nominally fo, like bifhops; donative, as the deans of chapters of the new foundation, deans of the royal chapels, deans of peculiars without cure of fouls, dean of the arches, appointed by commiffion from the archbifhop of Canterbury; prefentative, as fome deans of peculiars with cure of fouls, and the deans of fome chapters of the new foundation, if not all; the dean of Battel, the dean of Gloucefter, prefented by the king to the bifhop, with a mandate to admit him, and to give orders for his inftallment, and deans by virtue of another office, as the bifhop of London is dean of the province of Canterbury, and the bifhop of St. David's is dean of his own chapter.

Dean, *Rural*, or *Urban Dean*, was formerly an ecclefiaftical perfon, who had a diftrict of ten churches, or parifhes, either in the country or city, within which he exercifed jurifdiction. Thefe rural deans were fometimes called archipresbyteri; and at firft they were, both in order and authority, above the archdeacons. They were at firft elected by the clergy, and by their votes depofed; but afterwards they were appointed and removed, at the difcretion of the bifhop; and hence they were called decani temporarii, to diftinguifh them from the cathedral deans, who were called decani perpetui. They feem to have been deputies of the bifhop, ftationed round his diocefe, the better to infpect the conduct of the parochial clergy, to inquire into and report dilapidations, and to examine the candidates for confirmation, and therefore armed with an inferior degree of judicial and coercive authority.

We meet with rural deans as early as the ninth century. Hincmar, in a capitular to his archdeacons, referves the right of electing them to himfelf; and only allows it to the archdeacons, in cafe he be abfent, and by provifion only. Some take the rural deans to hold the rank and place of the chorepifcopi. Be this as it will, it is certain they are very ancient in France, Germany, and England; though, till the end of the fixteenth century, they were unknown in Italy; becaufe the bifhoprics being there exceeding fmall, they were not needed. St. Charles Borromeo is faid to have firft introduced them there. Their office is now wholly extinguifhed in England, the authority which they had being executed by the archdeacons and chancellors of bifhops; though their deaneries ftill fubfift as an ecclefiaftical divifion of the diocefe, or archdeaconry.

Dean, in the ancient monafteries, was a fuperior eftablifhed under the abbot, to eafe him in taking care of ten monks; whence he was called decanus, in imitation of thofe officers called by the fame name among the Romans, who had ten foldiers under them.

The monafteries being now lefs populous than they were in ancient times, the abbot, or prior, does not ftand in fo much need of being eafed; fo that thefe *deans* are, in general, fet afide.

Dean *and Chapter*. Anciently, bifhops did not ordinarily tranfact matters of moment "fine confilio prefbyterorum principalium," who were then called "fenatores ecclefiæ," and colleagues of the bifhops; reprefented, in fome meafure, by our chapters of cathedrals, wherein the dean and fome of the prebends are, upon the bifhop's fummons, to affift him in ordinations, deprivations, condemnations, excommunications, and other weighty concerns of the church, both religious and fecular.

When the reft of the clergy were fettled in the feveral parifhes of each diocefe, thefe were referved for the celebration of divine fervice in the bifhop's own cathedral. The dean and chapter are the nominal electors of a bifhop. The bifhop is their ordinary and immediate fuperior; and has, generally fpeaking, the power of vifiting them, and correcting their exceffes and enormities. At common law they had a check on the bifhop; for till the ftatute 32 Hen. VIII. c. 28. his grant or leafe would not have bound his fucceffors, unlefs confirmed by the dean and chapter. Co. Litt. 103. See Bishop, and Chapter.

Dean, Michel, in *Geography*, a market town in the county of Gloucefter, England, is fituated in the foreft of Dean; diftant weft from Gloucefter 12 miles, and from London 120. Its name is derived from the Saxon words *dene* and *micl*; the former allufive to its fituation in a deep dell; and the latter fignificant of its former importance, or its relative extent to a village, called Little Dean, in the neighbourhood. This place is principally noticed for its fine church and handfome fpire. The body is quadrangular, confifting of a nave, chancel, two north, and one fouth aifles; which, from having varioufly fhaped arches, appear to have been built at different periods. The roof is of oak, and its ceiling finely ftudded with rofes and other well carved devices. In the eaft window of one of the north aifles are fome remains of figures in ftained glafs, with which formerly the church appears to have been finely decorated. The font, which Mr. Lyfons fuppofes was cut out of the capital of fome ancient column, appears as old as the twelfth century. Adjoining the fouth aile, rifes a handfome tower, terminated by a well proportioned octagonal fpire; which meafures from the foundation, 156 feet in height.

Though the principal town in the foreft, it is an inconfiderable and ill-built place; formed by three fmall ftreets, uniting in the fhape of the letter Y. Formerly it was a ftaple for wool, and had a confiderable manufacture of cloth; but at prefent the only trade confifts in the fale of leathers, and the making of pins. It has a market weekly, on Mondays, and two annual fairs. The number of houfes, as returned under the late act, amounted to 125, of inhabitants 563. In the vicinity of Michel Dean are the remains of *Flaeley Abbey*, once a highly privileged, and celebrated monaftery of Ciftercians; founded in the reign of king Stephen, by Roger Fitz-Milo, fecond earl of Hereford, on the fpot where his brother, while hunting, had accidentally been killed

killed by a random arrow. Henry the second beftowed on it feveral manors, an iron forge, and two oaks weekly out of the royal foreft, to fupply the forge with fuel. In the fucceeding reign, this grant, having been found prejudicial to the foreft, was revoked, and a wood configned in lieu of it. At the time of the diffolution the annual revenues were valued at 112*l.* 13*s.* 1*d.* The abbey was granted to fir Anthony Kingfton. The abbot's lodge was in tolerable prefervation fo late as the year 1777, when a confiderable part of it was deftroyed by fire. The remainder having received many additions, forms the manfion of the prefent proprietor of the eftate, fir Thomas Crawley Boevy, bart. The floor of the chapter-houfe was difcovered a few years ago, at a fmall depth beneath the furface in the garden, and feven "ftone coffin-lids," probably flat ftones, were dug up, fculptured with ornamental croffes. In the church is an infcription to the memory of Mrs. Catherine Boevy, who died in 1726; for whom a cenotaph, commemorative of her virtues, was erected in Weftminfter abbey. Rudge's Hiftory, &c. of Gloucefterfhire, 2 vols. 8vo.

DEAN, *Foreft of*, in Gloucefterfhire, England, includes nearly the whole of that part of the county, comprehended between the river Severn on the eaft, the river Wye on the fouth-weft, and Herefordfhire on the north. By perambulations, made in different reigns, its extent was limited. The quantity of lands belonging to the crown, at prefent, appears to be 23,015 acres; exclufive of other property, which individuals have obtained by grants, or encroachments. It was formerly twenty miles in length, and fo full of wood, as to make it dangerous for travellers to pafs through it, from the fhelter it afforded to banditti. Formerly it afforded fuch excellent oak, and in fuch quantities, fit for the navy, as to be juftly the glory of our own country, and the envy of other nations. For it is ftated, that the officers who commanded the Spanifh armada had exprefs inftructions, after they had made good their landing, to proceed to the deftruction of our forefts; particularly that of Dean, in Gloucefterfhire. This grand refource has almoft failed. By the improvident grants of different fovereigns, the neglect of the foreft officers, and injudicious fellings, without adequate planting and fencing, to encourage the growth of young timber; fuch depredations have taken place, and are ftill committing, that threaten its annihilation as to the purpofes of the navy. At prefent it fupplies the royal dock yards, annually, with about 1000 loads of timber. In its prefent ftate and management, the foreft is divided into fix walks, and the government vefted in a lord-warden, who is by virtue of his office conftable of St. Briavel's caftle; fix deputy wardens; four verderors, who are chofen by the freeholders; a confervator; feven woodwards; a chief forefter in fee; a gaveller; and a fteward of the fwainmote. Thefe officers are empowered to hold a court of attachment every forty days, and another court called the juftice feat, once in three years. Thefe courts are held at the fpeech houfe, or king's lodge, which is fituated near the centre of the foreft. The whole being extra-parochial, and the inhabitants exempted from many taxes, with liberty of pafturage, and the privilege of finking mines, has induced many perfons to take up their refidence here. The free miners and colliers not only claim a right to dig for iron ore and coal, but, with the confent of the gaveller, to be fupplied with timber for their refpective works. The fixth part of the produce from each mine belongs to the crown, and the annual compofition for this, paid to the gaveller, is called the king's gawl. The crown poffeffes the exclufive right alfo of keeping in the foreft 800 deer; but from various caufes thefe are become fo fcarce, that the annual royal warrant, iffued for four bucks and four does, is frequently returned unexecuted. The general appearance of the foreft is beautiful and picturefque, containing rifing grounds interfperfed with deep vallies, abounding in places with fine coppices and orchards. The new roads lately made by virtue of an act, granted in the 36th year of his prefent majefty, have greatly facilitated the means of travelling through it. According to the account of fir Robert Atkins, the foreft only contained the fix lodges, which were erected for the keepers; but, according to the returns under the late act of parliament, the number of houfes within it was 720, and the population amounted to 3325.

DEAN *River*, or *Newark dyke*, in Nottinghamfhire, is, in fact, a fide branch of the Trent river, (which here has two channels,) paffing clofe under the walls of Newark caftle; it is navigable for about three miles, from the Trent river, to the town of Newark, has two locks upon it, and boats of 50 tons can navigate it; the exports thereon are corn, wool, Coddington paving-ftone, (blue lias,) and plafter-ftone or gypfum; the imports are coals, principally from the Derbyfhire pits at Codnor-Park, and Ilkefton; in Nottinghamfhire, at Brinfley, Bigarlee, and Eaftwood; and Yorkfhire, at Park-Gate and Bradford; the latter for the blackfmiths' ufe; Crich and Barrow lime are alfo imported, with deals, iron, &c., for the ufe of the town of Newark, and furrounding country. There is a ftone bridge of feven arches over the Dean at Newark, from whence the York road is embanked, acrofs the ifland or meadows in the Trent vale to Murkham, having 72 arches under the fame, for the paffage of the flood waters of this impetuous river. See CANAL.

DEANE, EDMOND, in *Biography*, brother to the bifhop of Offory, was born at Saltonftall, in Yorkfhire, in 1572. At the age of nineteen he was entered at Merton college in Oxford, and having continued there, and at St. Alban's Hall, until he was admitted doctor in medicine, he went and fettled at York. In 1626, he publifhed, at London, "Spadacrene Anglica, or the Englifh Spaw Fountain," being a brief treatife of the acid or tart fountain in the foreft of Knarefborough, in Yorkfhire. In a later edition, there are accounts of other mineral waters found in the foreft. "Admiranda Chymica, Tractatulus, cum Figuris," 8vo. Frankford, 1630. This has been feveral times reprinted. Sam. Norton, Wood fays, was efteemed half author of this book, there being in it fome of his tracts; fc. Catholicon phyficorum, Mercurius redivivus, &c. Dean is fuppofed to have died about the time the civil wars broke out, but in what year is not known. Wood's Athenæ Oxon.

DEARADERE, in *Geography*, a river of European Turkey, in Bulgaria, which runs into the Mariza near Demotica.

DEARNE and DOVE CANAL, is the parliamentary name of a navigable canal in Yorkfhire, between the Don river, a few miles below Rotherham, to the Barnfley canal, near the town of Barnfley, with fide-cuts to Rockcliff bridge, and to Cob-car Ing; it ferves for the export of the coals and iron of the great run of coals along which it paffes. See CANAL.

DEARTICULATION, in *Anatomy*. See DIARTHROSIS.

DEATH, in *Phyfiology*. "Death," fays Dr. Johnfon, "is the feparation of the foul from the body." However correct this definition may be deemed, in a moral or religious point of view, we cannot admit it as fufficiently precife for the purpofes of the phyfician and phyfiologift. We fhould propofe to define it as "the irrecoverable ceffation of all the functions which belong to a living animal." By this expla-

nation we diftinguifh *death*, 1ft, from all thofe conditions of the body in which any particular function or functions are deftroyed, while the reft remain in a more or lefs unimpaired ftate: 2dly, from *fufpended animation*, in which the vital powers are merely interrupted, and may be reftored to a ftate of activity within a certain period of time: and 3dly, from *putrifaction*, which denotes the chemical changes taking place in the conftituent ingredients of the *dead* body.

Living bodies are particularly diftinguifhed from inorganic matter by the mode in which their exiftence is terminated; and hence a termination by *death* becomes one of the grand characteriftics of *life*. The duration of an inorganized fubftance is dependent merely on the kind of compofition which determines its phyfical folidity; hence it muft be eftimated from the bulk and cohefion of each body, and muft be limited only by the nature and connection of its component parts. In living machines, on the contrary, the term of exiftence is neceffarily confined, and is not at all influenced by their compofition or fize. For many large and robuft animals do not laft fo long as others much weaker and fmaller. There are alfo relations of fize between living and inorganic bodies totally at variance with thofe of their refpective duration, fince in many inftances particles of extreme fmallnefs are infinitely more durable than the moft bulky animals or vegetables.

The duration of inorganic bodies muft always be influenced by the media in which they exift, and by the agents which furround them; but living beings are governed by very different laws. Their exiftence is not limited by the natural corruptibility of their component elements, but is protracted, although, by the nature of their formation, they tend rapidly to diffolution, to a much longer period than that tendency would have led us to expect. Liable, by their very effence, to decay and decompofition, they laft much longer than they would have done, had their duration been determined by the properties of their elements. It is prolonged by their internal active powers, to which there is nothing analogous in inorganized fubftances. Definitions of life have been drawn from various abftract and limited confiderations; the following general view will exhibit a more fatisfactory explanation of the fubject: "life is the affemblage of thofe functions which refift death." Every thing which furrounds living bodies tends to deftroy them. They are continually acted upon by inorganic fubftances; while at the fame time they exert a conftant and mutual influence on each other; they would foon yield, if they did not poffefs a permanent principle of re-action: life is that principle; unknown in its effence, it can only be appreciated by its phenomena; the moft general of which is an habitual alternation of action on the part of external bodies, and of re-action on that of the living body, the proportions of which vary at different ages. The infant poffeffes an excefs of life, fince the re-action exceeds the action; they are nearly in a ftate of equilibrium in the adult. The re-action of the internal principle diminifhes in old age, while the influence of external agents remains the fame; at that time the powers of life languifh and advance infenfibly to their natural termination, which takes place when all proportion has ceafed.

Death then is the inevitable condition to which all bodies, that have poffeffed life, muft fooner or later be reduced. The exact period of its approach may indeed be accelerated or retarded by various caufes; but the improved knowledge of modern times, in the compofition of our bodies, in the powers by which they are animated, and in the laws by which thefe are governed, has clearly fhewn that human exiftence, however prolonged for a few fhort years by attention to the circumftances that promote bodily health and ftrength, muft at laft arrive at its term. It has convinced every reflecting and reafoning mind, that there cannot poffibly be any means of protracting human life beyond a certain point; and that the attempts to difcover an elixir of youth and immortality are to be reckoned among thofe chimeras, which have too often employed the time, and bewildered the minds of the human fpecies.

Natural death is remarkable on this account, *viz.* that the functions of animal life, or thofe which connect the individual with the external world, confifting of fenfation, motion, and fpeech, ceafe long before the functions of organic life, or thofe by which its exiftence is maintained, as refpiration, digeftion, abforption, circulation, fecretion.

The man who dies at the conclufion of an advanced age expires in detail. His external functions gradually ceafe; the fenfes are loft in fucceffion, the ordinary ftimuli no longer producing any effect on the organs. The fight becomes obfcure and imperfect, and foon ceafes altogether to tranfmit objects to the fenforium. The hearing, feeling, and fmelling, are loft in the fame way. The tafte ftill remains awhile, as the fituation of its organ connects it with the organic as well as the animal life. Thus, when every agreeable fenfation is loft, and the ties which connected the old man to external objects, are nearly all deftroyed, this alone remains, and is the laft thread upon which the enjoyment of exiftence is fufpended. The inactive ftate of the organs of fenfe is quickly fucceeded by a lofs of the functions of the brain. Perception foon decays, when the fenfes fupply no matter for its exertion; and the power of imagination follows. The memory of recent occurrences is loft, becaufe the fenfes, weakened, and almoft dead, tranfmit them imperfectly to the brain. Paft tranfactions are ftill often remembered with tolerable exactnefs. Hence the old man judges only according to the fenfations which he has experienced heretofore; while the child is influenced folely by his prefent feelings; and the judgment in either cafe muft be equally uncertain.

As the interruption of the functions of the brain is a neceffary confequence of the nearly total annihilation of external fenfations, fo it affects, in its turn, the powers of locomotion and fpeech. The brain, being acted on by the fenfes, re-acts on the mufcles in a proportionate degree. The motions of the old man are few and flow; it is with difficulty that he quits his accuftomed attitude. Seated near the fire, which affords an agreeable fource of warmth to his languid frame, he paffes whole days retired, in a manner, within himfelf. Uninterefted in what furrounds him, a ftranger to all defires, paffions, and fenfations; fpeaking little, becaufe he has no inducement to fuch exertion, he is happy to feel that he ftill exifts, when he is loft to almoft every other feeling.

Are we juftified in confidering a rigid ftate of the mufcles, and diminifhed power of contraction in thofe organs, as another caufe of the inactivity of old age? This very probably has fome influence, but we cannot confider it as a leading caufe, fince the heart and inteftines muft partake of the fame affection of their ftructure, although they do not lofe the power of motion equally with the voluntary mufcles. The latter, therefore, do not lofe the *power*, but the *caufe* which fhould bring that into action, *viz.* the influence of the brain. If it were poffible to unite in the fame perfon the brain and fenfitive organs of the old man with the mufcles of a youth, the voluntary motions would not be more energetic than in the old fubject, becaufe there would ftill be wanting a caufe to excite the power into action.

From the preceding view, it appears that the external functions are gradually extinguifhed in the old man; and that the animal life is almoft annihilated, whilft the organic ftill retains its activity. At this time, the ftate of the man who is about

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to perifh by a natural death, approximates to that of the fœtus in utero, or of the vegetable, which lives only internally, and has no perception of external objects.

This inequality in the duration of the two lives is, in a certain degree, advantageous to the human fpecies, as it difengages the individual gradually from thofe ties which connect him to furrounding objects, and thus alleviates the regret with which he would otherwife contemplate the hour, when thefe bonds are to be finally fevered. The thought of death is painful only becaufe it terminates our animal exiftence, and thereby extinguifhes all thofe functions which keep up our relations to the external world. It is nothing but the interruption of thofe functions, that makes us look on death with feelings of fear and regret. We do not dread the fuffering of bodily pain; for moft perfons on their death-bed would gladly embrace the offer of a lengthened exiftence, even although it were purchafed by uninterrupted fuffering.

> The weariest and moft loathed worldly life,
> That age, ache, penury, and imprifonment can lay on man,
> Is paradife to what we fear of death.

Could we imagine to ourfelves an individual, in whom death fhould affect the internal functions only, as circulation, digeftion, fecretion, &c., leaving the animal life ftill in vigour; fuch a man would contemplate with indifference the approaching end of his organic exiftence, becaufe he would feel that the pleafures of life are not attached to that, and that he would ftill be able to feel and enjoy almoft every thing which formerly conftituted his happinefs. Since then the animal life ceafes by degrees; fince each of the ties, which connects us to the pleafure of living, is broken very gradually, this pleafure leaves us at laft almoft imperceptibly, and we have already become infenfible to the value of life, before it is terminated by the ftroke of death. This is the courfe of things that we obferve in the old man, who paffes, by the fucceffive and partial lofs of his external functions, to the clofe of his exiftence. His death is that of a vegetable, which, having no relations to external objects, and no confcioufnefs of life, can have none of death.

The organic exiftence, which ftill remains to the old man after the almoft entire lofs of the animal life, ends in a very different manner from what we obferve in violent and fudden deaths. In the latter we may diftinguifh two periods: the firft, which is marked by the fudden ceffation of refpiration and circulation, two functions which ceafe in thefe cafes nearly as foon as the animal life; the fecond, which comes on more flowly, is the gradual termination of the organic functions. The digeftive juices ftill act on the contents of the ftomach, which even retains, in fome degree, the power of propelling the food. Abforption, as numerous experiments have fhewn, ftill goes on for fome time. And inftances are by no means rare, where the bladder and rectum, by the irritable power which their coats ftill retain, expel the urine and fæces fome time after the apparent period of a fudden death. Nutrition is ftill manifefted in the hair and nails; and, together with fecretion, would no doubt be equally obvious in other parts, if we had the power of obferving thofe infenfible motions in which thefe functions confift. Animal heat is preferved in moft fudden deaths, and particularly in afphyxia, much beyond the time which would be neceffary for the diffipation of that, which the body, confidered as a mafs of dead matter, contains at the inftant of apparent diffolution.

Many other facts might be adduced, to prove, in concurrence with thofe already ftated, that the organic functions terminate flowly and gradually in fudden deaths; that the harmony of the internal life, confidered as a whole, is firft affected in thefe cafes; that the general circulation and refpiration are firft arrefted, but that the other vital organic proceffes are fucceffively and flowly extinguifhed. In the natural conclufion of old age, on the contrary, life ceafes, becaufe each function has been terminated in detail. The active powers gradually defert each organ; digeftion languifhes; fecretion and abforption are arrefted; the capillary circulation becomes troubled, and being deprived of the tonic powers, which prefide over it, ftops. The general circulation is then fufpended in the large veffels; and laftly, the contractions of the heart ceafe; fo that this part is rightly termed the *ultimum moriens*. We may therefore bring the differences, which exift between the death from old age, and that which arifes from fudden caufes, into the following view. In the former, life is firft extinguifhed in the parts, and then ceafes in the heart; fo that the influence of death is exerted from the circumference to the centre. In the latter, it ceafes firft in the heart, and then in all the parts: fo that the phenomena of death take place from the centre to the circumference.

Having thus defcribed the manner in which death takes place, when it occurs as the natural clofe of life, we proceed to confider the mode of its occurrence when it appears before the time allotted by nature as the clofe of our exiftence. So powerful indeed is the influence exerted by fociety, that individuals of the human fpecies feldom arrive at that period. Animals generally reach it; but the ceffation of exiftence, produced by mere old age, has become with us a rare phenomenon. Accidental death becomes, therefore, an object particularly worthy of our attention. This may take place in two ways; either as the fudden refult of a great difturbance excited in the animal economy, or as the flow and gradual termination of difeafe. In the former cafe, as for inftance in apoplexy, great hemorrhage, concuffion, afphyxia, we can inveftigate the laws, which regulate the termination of the different functions; becaufe the organs of the body are unaffected, and ceafe to act by the influence of caufes directly the reverfe of thofe which kept them in exertion in the natural ftate: now, as the latter are partly underftood, they naturally lead us to a knowledge of the former. We can, moreover, imitate thefe kinds of death on animals, and are thus enabled to analyfe their various phenomena by the way of experiment. In the cafe of difeafes, neither of thefe methods is open to us; we cannot produce them artificially, nor are we fufficiently acquainted with the nature of thofe morbid changes which occur in the vital powers, when the body is under the influence of difeafe, to reafon on them with any precifion. The firft remark fuggefted to us by the obfervation of various fpecies of fudden death, is, that in all inftances the organic functions may ftill fubfift for a certain time, after thofe of animal life have been annihilated: while, on the contrary, the latter never furvive the termination of the former. An individual who has fuffered compreffion of the brain, or who has been attacked by apoplexy, ftill lives internally for feveral days after he has ceafed to exift for external objects. If, on the contrary, death attacks any effential organic function, as the circulation in cafes of wounds or aneurifmal ruptures of the heart, refpiration in the different kinds of afphyxia, &c. thofe functions are fuddenly terminated, but the animal life ends at the fame inftant. Even here a part of the organic proceffes ftill continues for a greater or lefs length of time, and ends only by degrees. Thefe obfervations are of the firft importance in a practical point of view, as leading us to the exertions we make ufe of in inftances of apparent death from hanging, drowning, fuffocation,

cation, &c. They teach us that the loſs of ſenſation and voluntary motion, together with a ceſſation of reſpiration and of the heart's action, are by no means ſure indications of death; that the powers of life ſtill exiſt under theſe circumſtances, and may be again called into action by the employment of proper means; and that ſuch caſes are, therefore, well deſcribed by the term of *ſuſpended animation.*

A warm-blooded animal never continues to exiſt externally after its internal life has ceaſed; ſo that the ceſſation of the organic phenomena is a ſure ſign of general death. We can, indeed, decide on the reality of ſuch death only by this criterion, ſince the ſuſpenſion of the external functions is almoſt always an uncertain ſign.

This difference in the termination of the two lives ariſes from the kind of influence which they exert on each other, from the ſpecies of connexion which unites them. For though they are diſtinguiſhed by numerous characters, their principal functions are connected by a reciprocal influence. This bond of union ſeems to exiſt between the brain on one ſide, for the animal, and the lungs or heart on the other, for the organic life. The action of any one of theſe three organs is eſſentially neceſſary to that of the two others. When, therefore, one ceaſes to act, the others muſt likewiſe be arreſted; and as they are the three centres, in which all the ſecondary phenomena of the two lives terminate, theſe phenomena muſt be inevitably annihilated, and general death enſue.

Phyſiologiſts of all ages have recognized the importance of this triple centre; and have almoſt univerſally beſtowed the name of *vital functions* on thoſe which reſide here: becauſe life is immediately connected with them, while its relations to the proceſſes, ranged under the heads of natural and animal functions, are much leſs intimate.

All ſudden deaths muſt begin by the interruption of circulation, reſpiration, or the action of the brain. One of theſe three functions ſtops firſt, and the others terminate ſucceſſively. The ſeries of phenomena, which occur in theſe caſes, has been admirably developed in the "Recherches phyſiologiques ſur la vie et la mort" of Bichât. We ſhall have occaſion to notice ſeveral of his experiments and remarks in the articles relating to phyſiology; and ſhall therefore confine ourſelves, on the preſent occaſion, to a ſketch of the general concluſion which he draws from them.

Death beginning in the heart: exemplified in the rupture of an aneuriſm, in a wound of the heart, or large blood-veſſels, &c. For want of the excitation, which the brain receives from the heart, its action ſtops; and conſequently ſenſation, locomotion, and the voice, are immediately interrupted. Beſides, the organs of theſe functions would ceaſe to act, for want of the excitement derived from the blood, even if the brain could ſtill exert its influence. The individual, therefore, exiſts no longer for ſurrounding objects after the inſtant in which his heart is dead. The interruption of the organic functions, which has commenced with the circulation, goes on at the ſame time with reſpiration. When the brain has ceaſed to act, there are no longer any mechanical phenomena exhibited in the lungs; ſince the diaphragm and intercoſtal muſcles are under its influence. The chemical phenomena ceaſe alſo, when the heart no longer receives or ſends the materials neceſſary for their developement. General death then comes on in a gradual way, by the ſtoppage of the ſecretions, of exhalation, and nutrition.

Death beginning in the Lungs.—When the mechanical phenomena of the lungs are interrupted, the following is the ſeries in which the other functions ceaſe. 1. Interruption of mechanical phenomena. 2. Ceſſation of chemical phenomena for want of the air which ſupports them. 3. Annihilation of the brain's action through the deficiency of excitement by the red blood. 4. Extinction of animal life; becauſe its organs are no longer excited by the brain and the arterial blood. 5. Ceſſation of the general circulation: 6. And of the capillary circulation, ſecretion, abſorption, and exhalation, for want of the influence of red blood on the organs of thoſe functions. 7. Interruption of digeſtion, through the want of ſecretion, and through the non-excitation of its organs, &c.

The phenomena of death occur in a different ſucceſſion, when the chemical functions of the lungs are interrupted; as in animals placed in vacuo, in ſtrangulation, in drowning, and in breathing non-reſpirable gaſes.

1. Interruption of chemical phenomena. 2. Suſpenſion of the brain's action. 3. Ceſſation of ſenſation, locomotion, the voice, and the mechanical phenomena of reſpiration. 4. Stoppage of the action of the heart, and of the general circulation. 5. Termination of the capillary circulation, ſecretion, exhalation, abſorption, and, conſequently, of digeſtion. 6. Diſſipation of the animal heat, which reſults from all the functions, and which does not leave the body till they have all ceaſed. In whatever function death may begin, it is always by this that it ends.

Death beginning in the Brain.—1. Annihilation of the action of the brain. 2. Sudden ceſſation of ſenſation and voluntary motion. 3. Paralyſis of the diaphragm and intercoſtal muſcles. 4. Interruption of the mechanical phenomena of reſpiration: 5. And of the chemical phenomena. 6. Admiſſion of black blood into the ſyſtem which ſhould convey red blood. 7. Retardation of the circulation from the contact of this blood with the heart and arteries, and by the abſolute immobility of all the parts, and particularly of the cheſt. 8. Death of the heart, and ceſſation of general circulation. 9. Interruption of organic functions, eſpecially in parts uſually ſupplied with red blood. 10. Abolition of animal heat.

Although in the three kinds of death, which we have juſt noticed, the functions may be annihilated ſuddenly, yet ſome of the vital powers ſtill remain in the parts for a certain length of time. Organic ſenſibility and contractility (the powers which preſide over the organic functions) are ſtill very manifeſt in the muſcles of both claſſes; and the muſcles of the animal life ſtill exhibit very clearly a ſuſceptibility of galvanic agency. This permanence of the organic properties is nearly the ſame in all caſes; the only cauſe which gives riſe to any difference, is the more or leſs gradual mode in which life has been extinguiſhed. In proportion to the rapidity of the death, is the contractility energetic, and ſlow in diſappearing. Where the functions have been gradually extinguiſhed, this property is ſo much the leſs ſuſceptible of being brought into action.

General Deſcription of Death.—The uſe of the hands, eyes, and feet generally is impaired in old perſons ſome time before death; the ſenſes fail; the bowels are torpid; the pulſe ſlow and intermittent; ſleep or dozing frequently occurs; and the laſt portions of the urine are not expelled from the bladder. The ſpeech becomes embarraſſed; the head cannot be held up; and the hands no longer execute the commands of the will. Laſtly, reſpiration becomes laborious, ſlow, interrupted, and ſtertorous; the diſtreſs excites an effort to breathe, which the debility renders nearly ineffectual. Some time before death, the heart is manifeſtly unable to drive the blood through the arteries into the veins; ſo that it is collected after death in the former veſſels. The blood then deſerts the feet, which grow

grow cold; and the heat retreats upwards with the blood, which may be obferved in experiments to be driven no farther than the groin; there it reaches no farther than the kidneys, and there is a reflux, driving it back through the fpace in which it had juft before been urged forwards. The flux and reflux then reach fucceffively no farther than the diaphragm, the eighth or fixth ribs, and the arch of the aorta. Laftly, the blood flows back upon the heart itfelf. This vifcus now refts for a fhort time, and then makes an effort to free itfelf from the contained blood. The impoffibility of driving this through the lungs creates a fenfe of anxiety, which gives rife to the laft ftruggle of departing life. The heart's action and refpiration are imperfectly performed for a few times at irregular intervals, till at laft the accumulated blood is no longer a fufficient ftimulus, and the fenfibility and contractile power of the organ are finally loft. Refpiration ceafes by a ftrong expulfion of air from the cheft, often accompanied with a figh or groan, and arifing, perhaps, partly from the action of the expiratory mufcles, and partly from the natural effect of the elaftic powers refiding in the parietes of the thorax. Hence, in common language, to *expire* has become fynonymous with to *die*. The action of the left ventricle ceafes firft, as the obftruction of refpiration cuts off its fupply of blood. The right ventricle then ceafes to act, although it ftill receives blood from the venæ cavæ. The auricle even now palpitates for a while, and receives and repels the blood alternately with the venæ cavæ, till it alfo grows infenfible to the ftimulus.

The mufcles are relaxed at the moment of death; fo that the limbs fall into that pofition to which the force of gravity would naturally bring them. Hence, the mouth is ufually open from the dropping of the under jaw; and all the members of the body are eafily bent and moved in every direction. Sooner or later, however, a very different ftate of the mufcles fucceeds: they become firmly contracted, and bring the whole body into a moft rigid ftate; fo that no part can now be moved, without the application of a very great force. They remain in this ftate until the natural progrefs towards putrefaction again foftens their fibres. Phyfiologifts regard this phenomenon, together with that of the coagulation of the blood, as arifing from the laft exertion of that refidue of vital power, which the body retains after the period of apparent diffolution. It does not take place in an invariable manner in all kinds of death. In animals killed fuddenly by lightning, or by a powerful electrical fhock, the body does not ftiffen, nor does the blood coagulate; this is explained by ftating that the vital principle is totally and fuddenly extinguifhed over the whole body in fuch kinds of death; and that the moment of *apparent diffolution* is alfo that of *abfolute univerfal death*. We are alfo informed that thefe changes do not take place in the bodies of animals killed by wounding the medulla fpinalis; and that where this method of flaughtering them for food is practifed, the meat may be dreffed the fame day, without being found tough. (Adams on Morbid Poifons, ed. 2d. Prel. Remarks, p. 34.) A fimilar obfervation has been made concerning animals hunted to death; as well as the human fubject, when dying of fome peculiarly malignant, and, as they are often called, putrid fevers. Here the exertions of the animal in one cafe, and the progrefs of the difeafe in the other, have been fuppofed to extinguifh the vital principle almoft entirely, previoufly to death.

Signs of Death.—Much difpute has arifen on this fubject, in endeavouring to afcertain fome particular appearance, by which we may be certain that death has really taken place. The preceding account will fufficiently convince the reader, that the ceffation of refpiration and the heart's action cannot be relied on for this purpofe. Thefe figns become ftill more fallacious on account of fome extraordinary cafes of recovery from apparent death: although in common they may be regarded as a fufficiently fure criterion that the perfon is dead. In fpeaking on this fubject, Haller refers to the lofs of the irritable power of the heart; but this we have no means of afcertaining. As fingle fymptoms, neither the ceffation of the pulfe and breathing, nor coldnefs of the body, nor want of efflux of blood from a vein, nor infenfibility to ftimuli, nor relaxation of the fphincters, and other mufcles, can be trufted to. But we may undoubtedly judge with great certainty from the combination of thefe various figns, and their continuation. Perhaps the rigid ftate of the body, produced by the contraction of the mufcles, would be as fure a fign of death as any individual circumftance. But this only lafts for a certain time.

Putrefaction is the fpontaneous decompofition which dead animal bodies undergo, and which is to be regarded as one of their moft ftriking peculiarities. This fubject might indeed be confidered as foreign to phyfiology, defined, as it has been, by fome of the moderns, as the *fcience of life*: but when we confider that the changes occurring in the dead body, after the departure of the vital principle, throw light on that principle itfelf; the hiftory of the body will ftill belong to the phyfiologift, until its appearance can no longer recal any notion of its former ftate, and every trace of organization has been completely effaced. The organs of the body, when abandoned by the vital powers, pafs under the dominion of thofe phyfical laws, which govern all other inorganic matter. A new motion takes place in their interior, and their component elements manifeft a tendency to feparate from each other, ftronger in proportion to the complexity of their compofition. We learn from chemiftry that the difpofition of any body to change its mode of exiftence is in a direct ratio with the multiplicity of its elements; and that an organized being will remain undecompofed fo much the longer, if its compofition be fimple, and its component parts few and not volatile in their nature.

A neceffary condition for the occurrence of putrefaction is that the body fhould be totally deprived of life; the vital powers are the moft efficacious antifeptic, and life itfelf is nothing more than a conftant ftruggle againft phyfical and chemical agency. Life and putrefaction are therefore two abfolutely contradictory ideas; and when we hear various difeafes characterized by the epithet putrid, we muft recollect that the changes denoted by this expreffion are by no means fuch as occur in putrefaction. The other circumftances neceffary to the decompofition of the dead animal body are, 1ft, a certain temperature, which fhould be above 10° of Reaumur's fcale. Cold carried to the freezing point is a complete prefervative from putrefaction, as long as the animal fubftance is expofed to it. Hence the practice of keeping meat in fnow in northern countries, and of tranfporting fifh packed in ice to confiderable diftances. In general, the higher the temperature the more rapid is the putrefaction, provided the heat be not fufficient to reduce the body to drynefs; for then it is brought to the ftate of fome mummies. 2d, A certain degree of moifture is alfo neceffary, otherwife the body might be reduced to a mummy. 3d, The contact of air promotes the decompofition by volatilizing the difengaged elements, which rife in the form of vapour. It is not, however, effential, as putrefaction will go on in vacuo.

The phenomena of putrefaction, refulting from a feries of particular attractions, affume various modifications, according to the kind of fubftance which undergoes this change; the

the medium, in which the procefs takes place; the different degrees of temperature and moifture, under which it is carried on; and the ftage of the procefs itfelf. Thefe varieties may be included in the following general defcription. A difgufting cadaverous fœtor efcapes from the part, which fwells, foftens, and changes its colour fucceffively to various fhades and mixtures of green, blue, and blackifh brown. A dirty and very fœtid ferous matter exudes; the texture of the part becomes relaxed, and its organization deftroyed. We notice at the fame time the efcape of various gafeous products, which are chiefly of an ammoniacal nature; and hence arifes the pungent odour which is often very ftrong in every ftage of the procefs. The other gafes are the carbonic acid, which unites with the ammonia; hydrogen joined with phofphorus, fulphur and carbon, and azote. The odour gradually fubfides; the refiduary matter, confifting of oils and falts, becomes more confiftent, and of a deep colour, and laftly forms a friable and rather deliquefcent fubftance, particularly ufeful as a manure. The bones, being of a much more durable nature, retain their compofition and figure, for a great length of time; yet if expofed for a feries of ages to air and moifture, their animal portion finally decays, and the earth crumbles away into a duft. Thus at length every trace of our material exiftence completely difappears. "Putrefaction," fays a modern phyfiologift, "when confidered philofophically, is the method employed by nature to bring back our organs, when deprived of life, to a more fimple ftate of exiftence, that their elements may be employed in forming new combinations. (*Circulus eterni motus.* Beccher.) Nothing therefore can be more clearly proved than the metempfycofis of matter; and we may reafonably conclude, that this tenet, like moft of the religious rites and fabulous conceptions of antiquity, is only a myfterious veil, dexteroufly interpofed between the people and the knowledge of nature by the hand of philofophy." Richeraud, Elemens de Phyfiologie, tom. ii. p. 491.

When dead animal matter is accumulated in a confiderable mafs, fo that its decompofition is effected by the reciprocal action of its ingredients upon each other, or when it is placed in a running ftream of water, the changes that enfue are very different from thofe firft detailed. All the foft parts are diminifhed in fize, and converted into a peculiar fatty matter, poffeffing much of the appearance and properties of fpermaceti. This was obferved firft at the burial ground of the Innocents in Paris, where the poorer people were buried in vaft numbers in large pits. Every part of the body undergoes this change. The fubftance in queftion exhibits all the properties of foap, with an excefs of fatty matter: and is ftated by Fourcroy to confift of adipous fubftance, combined with ammoniac. It is applicable to all thofe manufactures in which tallow is ufed. See ADIPOCIRE.

DEATH, in *Pathology*. It has already been fhewn, that, when death occurs before the natural changes, induced by old age, in the animal economy, have brought life to a conclufion, it happens in confequence of fome fudden difturbance of the fyftem, or of the more gradual operation of difeafe. In the former cafe, and in fome of the more rapid inftances of the latter, an interruption of the functions of the heart, the lungs, or the brain, has been fhewn to be the immediate caufe of death; *i. e.* death in fuch cafes begins in one or the other of thefe vital organs. It remains, then, for us to point out the morbid changes, produced in thofe organs, either by external violence, or the internal action of the conftitution, by which their functions are obftructed, and death is neceffarily brought about.

Morbid Caufes of Death.—Difeafes which directly impede the functions of the heart are, compared with thofe that obftruct the brain and the lungs in their action, but few, and of fomewhat rare occurrence. Death is, however, thus produced occafionally; as when an aneuryfm of the heart, or of the great veffels attached to it, is ruptured; or when an abfcefs forms in the fubftance of the heart; or when the heart is wounded from external force. Several inftances of a rupture of the heart itfelf, difcovered on the diffection of perfons who had died fuddenly, are recorded by Morgagni, (De Sedib. et Cauf. Mobor. Epift. xxvii.) in which the blood was in confequence poured out, through the opening, into the fac of the pericardium, and neceffarily prevented the continuance of the motion of the heart. The fubftance of the heart was, in fome of thefe cafes, corroded by ulceration; in others rendered thin by dilatation. An obftruction to the heart's action is alfo occafioned by a dropfy of the pericardium, when that invefting membrane is diftended with a watery effufion from its veffels. The heart is likewife impeded by the contrary condition of that membrane, namely, when it adheres firmly to the furface of the heart. See Cullen, Firft Lines, § 1185.

It is the opinion of Morgagni, that the heart, being a mufcular fubftance, is, like other mufcles, liable to fpafm or convulfion, and that death is in fact fometimes the refult of a fpafm of the heart. He quotes the opinion of Herophilus, who taught that fudden death, when it originated from no very evident caufe, muft be attributed to fuch a fpafm; and he obferves, that a convulfion of the heart is more than once mentioned by Hippocrates. See Epift. xxv. Art. 13. To this caufe Bichât attributes the fudden death, which is fometimes induced by ftrong emotions of the mind; as by exceffive joy or defpair, excited by the unexpected news of certain events, or the fight of unexpected perfons or objects, &c. Although it may not be conceded to him, that thefe circumftances influence the heart directly, and the brain only in a fecondary way; yet it muft be admitted, that the heart is affected by ftrong mental emotions in a degree far beyond the other organs in general, and difproportionately to the affection of the brain; and that its ceffation, therefore, is the more immediate caufe of the death which enfues. The death, in this cafe, is a permanent fyncope, and differs from a common *fainting fit* only in its duration. See Bichât, loc. cit. p. 231.

As the function of refpiration is two-fold, confifting partly of mechanical, and partly of chemical operations; fo death may begin in the lungs, when either the one or the other of thefe actions is interrupted, by external accident, or by difeafe. The mechanical act of refpiration is arrefted partially or completely by the diflocation of the fpine of the neck, and the confequent compreffion of the fpinal marrow, in that part: it is partially impeded if the diflocation take place below the origin of the phrenic nerves; becaufe then the intercoftal mufcles alone are paralyzed, and breathing goes on to a certain degree by means of the diaphragm: it is completely arrefted, if the compreffion is above that point of the fpinal marrow, from which the phrenic nerves originate; becaufe the diaphragm is then paralyzed too. The mechanifm of refpiration may be alfo obftructed by any large wound or aperture into the thorax, through which air may be freely admitted; for, in fuch a cafe, the external air will rufh in, on the expanfion of the cheft, and, preffing on the furface of the lungs, will counterbalance the air in their cells, and thus prevent their alternate diftenfion and evacuation, by the motion of the ribs and the diaphragm.

Some difeafes terminate in death, in confequence of mechanically impeding the admiffion of air into the lungs. The hydrothorax, or dropfy of the cheft, which confifts of an

an effufion of a watery fluid into the cavity of the thorax between the lungs and the ribs, neceffarily retains the lungs in a compreffed and contracted ftate; it is the more fpeedily fatal, if combined with the dropfy of the belly, and of the pericardium; the former of which, by preffing the diaphragm upwards, caufes an additional contraction of the cavity of the cheft; the latter, by occupying a larger fpace in that cavity. An oppofite morbid condition has fometimes, though rarely, produced death, by a mechanical impediment to refpiration; namely, an univerfal adhefion of the lungs to the ribs and diaphragm, which altogether prevented the play of the lungs, and the proper expanfion of the cheft. A cafe of this defcription is recorded by Dr. Marcet, in the Edinburgh Medical and Surgical Journal, vol. i. p. 412. It is probable that a convulfive ftate of the mufcles of refpiration occafionally produces a fatal interruption to the mechanical act of refpiration in fome convulfive difeafes. See Lancifi de fubitaneis mortibus, lib. i. cap. 9.

But the more common caufes of a fatal interrupton of the function of the lungs, confift of impediments to the chemical changes in the blood, which are neceffary to the fupport of life; that is, of impediments to the accefs of pure air, or air containing oxygen. Thus life is fpeedily deftroyed by hanging or drowning; the preffure of the rope obliterating the paffage of the wind-pipe in the former cafe, and water preventing the accefs of air in the latter. See STRANGULATION and DROWNING. In the fame way the introduction of any foreign fubftance, as particles of food, &c. into the glottis, may occafion a fatal impediment to breathing, and the perfon is faid to be choked. Among the cafual caufes of fuffocation, the breathing of the deleterious airs generated in mines, at the bottom of wells, or in clofe rooms by the burning of charcoal fires, the fermentation of liquors, or the refpiration of a crowded people, are the principal. Of the firft we have inftances in the *choke-damp*, as it is called by miners, confifting of carbonic acid, and which fpeedily kills thofe who are unfortunately immerfed in it; and of the laft, the fatal imprifonment in the black-hole at Calcutta affords a memorable example.

Many difeafes terminate fatally by impeding the chemical changes of the blood in its paffage through the lungs. Some operate by obftructing the entrance of air through the paffages, fuch as croup, in which the wind-pipe is ftuffed up by a fecretion of lymph from its internal furface, which produces fuffocation; and fpafmodic afthma, in which, during the paroxyfm, the paffages are fpafmodically contracted. But a more fudden and complete interruption to the communication of air to the circulating fluids, is occafioned by the burfting of a large blood-veffel within the lungs, and of courfe by the fudden filling up of the air-cells and paffages with blood. A fimilar refult follows the burfting of a large abfcefs, or vomica, in the lungs, as fometimes occurs in pulmonary confumption, or after acute inflammation of thofe organs; it follows likewife from the rapid effufion of lymph into the cells, in the latter difeafe, and more gradually from the redundant fecretion of mucus in the peripneumonia notha, and in the catarrh of old and debilitated perfons. Occafionally, a dropfical effufion into the fubftance of the lungs, or anafarca pulmonum, arrefts the procefs of refpiration in a fimilar manner. So numerous are the morbid changes in the organs of breathing, by which life is annihilated.

Bichât is difpofed indeed to affirm, that in the majority of flow difeafes of every kind, death begins in the lungs. But, although a difficult and laborious refpiration is one of the moft obvious fymptoms of departing life, yet an accurate obferver will remark, in many cafes, a previous failure in the functions of the brain, or of the heart and arterial fyftem; and this affection of the lungs muft be confidered, under fuch circumftances, as fecondary, in this circle of affociated and mutually dependent functions.

The morbid affections which terminate life, by impeding the operations of the common fenforium on the organs of the body, are very numerous, as will be obvious from a flight perufal of the works of Morgagni and other morbid anatomifts. The different parts of the brain, and its invefting membranes, have been found thickened, indurated, inflamed, converted into bone, connected by adhefion, compreffed by effufions of blood, or of its feparate parts by diftended veffels, by abfceffes, tumours, hydatids, and excrefcences from the cranium. And befide thefe palpable and evident caufes of the death of the brain, the fame confequence has refulted from concuffion, as it is termed, and even from flight blows, where no perceptible alteration had been produced. In thefe various morbid affections of the encephalon, the fymptoms, which precede death, are thofe of apoplexy, palfy, coma, fatuity, epilepfy, frenzy, fever, hemicrania, &c.; or, in other words, thefe difeafes deftroy life by compreffion, or irritation of the brain in fome of the modes juft ftated.

The functions of the brain may be deftroyed by feveral vegetable and animal poifons; the former, when taken into the ftomach, affecting the brain through the medium of the nerves of that organ; the latter, being inftilled into a wound, fometimes deranging the fenforium by means of the circulation directly, as the poifon of the rattle-fnake and the viper; and fometimes perhaps indirectly, as the poifon from a rabid animal, by the abforbents. Between the ftomach and the brain, a clofe connection through the nervous fyftem exifts, whence perhaps not only an overdofe of opium, henbane, or fpirituous liquors, &c., but a blow on the epigaftric region, or the *wind* of a cannon ball, as has been affirmed, have often produced inftantaneous death.

The fenforial power, however, is not only deftroyed by the mechanical changes of ftructure in the brain above enumerated, and by the influence of narcotic fubftances, and other caufes, through the medium of the nerves; but many other circumftances conduce to exhauft it, and thus to terminate life. It is a general fact in the animal economy, however whimfically Brown and Darwin may have theorized upon it, that the fenforial power, (or excitability, or nervous energy, or by what other term we may chufe to defignate it,) is diminifhed and exhaufted by long continued or exceffive action, as well as by the abftraction of thofe matters neceffary to the fupport of the body. Thus death is occafioned by the exceffive vafcular action in fevers, which exhaufts the nervous power when no morbid ftructure of any of the three vital organs exifts; the fupport of the conftitution by digeftion and nutrition being at the fame time withdrawn. Thus alfo the exceffive mufcular action in convulfions fometimes exhaufts life; and even long continued violent pain, or thofe lefs intolerable feelings which come under the denomination of irritation, not unfrequently wear down the vital powers, as in the confluent fmall-pox, when the fkin is covered with puftules. In chronic difeafes accompanied by hectic fever, the conftitution is thus worn out, perhaps in a great meafure by the defect of nutrition, in confequence of the lofs of the digeftive power, which every ftate of fever occafions, as well as by the great exhauftion of the febrile action, and of the profufe fweats.

By the abftraction of nourifhment, produced in various ways, life muft be obvioufly exhaufted, as by long fafting; or by an obftruction to the digeftive procefs, or to the paffage of the food into the inteftines (in fchirrous pylorus), or through the lacteals into the blood (in mefenteric difeafes). Or it may be exhaufted by great difcharges of the blood itfelf,

in great hæmorrhages; or by profufe fecretions from the blood, as of the urine in diabetes; of fweat in chronic difeafes; of the inteftinal liquids, in diarrhœa, and dyfentery; of the fluids of the uterus and vagina, in menorrhagia, fluor albus, &c. The abftraction of the neceffary ftimulus of heat, or, in common language, the application of cold, is frequently fatal to the powers of life. (See COLD.) So true is the obfervation of Seneca, "nafcimus uno modo, multis morimur."

The confideration of the phyfical procefs of death is generally fhunned, although on a near view it lofes much of its horror. Thofe who have frequently witneffed it allow that it is not generally a painful procefs. In fome delicate and irritable perfons, a kind of ftruggle is indeed fometimes excited, when refpiration becomes very difficult; but more frequently the dying obvioufly fuffer nothing, and exprefs no uneafinefs. Our obfervation accords with that of an elegant and intelligent writer, who obferves, "in thofe who die of chronic dieafes, the gradation is flow and diftinct. Confumptive patients are fometimes in a dying ftate during feveral days; they appear at fuch times to fuffer little, but to languifh for complete diffolution; nay, I have known them exprefs great uneafinefs, when they have been re-called from the commencement of infenfibility, by the cries of their friends, or the efforts of the attendants to produce pain. In obferving perfons in this fituation, I have always been impreffed with an idea, that the approach of actual death produces a fenfation fimilar to that of falling afleep. The difturbance of refpiration is the only apparent fource of uneafinefs to the dying; and fenfibility feems to be impaired, in exact proportion to the decreafe of that function. Befides, both the impreffions of prefent objects, and thofe recalled by memory, are influenced by the extreme debility of the patient, whofe wifh is for abfolute reft. I could never fee the clofe of life, under thefe circumftances, without recollecting thofe beautiful lines of Spenfer:

> "Sleep after toil, port after ftormy feas,
> Eafe after war, death after life, doth greatly pleafe."
>
> Ferriar. Med. Hift. b. I.

We have obferved in more inftances than one, a perfon juft finking into the fleep of death, expreffing in a languid voice, but with every fign of perfect complacency, a fenfe of his dying ftate. In fudden deaths nothing can be faid on this point, as little time intervenes between the commencement of death and abfolute infenfibility; and in acute difeafes infenfibility often precedes death for fome confiderable time.

It is the tafk of humanity, however, to mitigate the fufferings of the dying, and, where nature has produced none, to take care that the officioufnefs of art fhould not inflict them. The length of the interval between infenfibility and the abfolute ceffation of exiftence, has given rife to a multitude of fuperftitious notions and mifchievous practices among the vulgar. Indeed fome of thefe notions are of confiderable antiquity; but it does not appear that, in thofe early ages, the attendants prefumed to accelerate the death of the fufferer. In the 16th and 17th centuries, however, it was very common to ftrip the dying, to drag them out of bed, and place them on mattraffes of ftraw or hair, in the middle of the room. Religious habits, afhes, and relics, were then thrown upon them, for the confolation of thofe,

> ——"who, to be fure of Paradife,
> Dying put on the weeds of Dominic,
> Or in Francifcan thought to pafs difguis'd."

The effects of thefe impreffions ftill remain. It is a prevalent notion among nurfes and fervants, that a patient, whofe death is lingering, cannot quit life while he lies on a common bed, and that it is neceffary to drag the bed away, and to place him on the mattrafs. This piece of cruelty is often practifed, when the attendants are left to themfelves. A ftill more hazardous practice has been very prevalent in France and Germany, and, it is to be feared, is not altogether unknown in this country. When the patient is fuppofed by the nurfes to be nearly in a dying ftate, they withdraw the pillows and bolfter from beneath his head, fometimes with fuch violence as to throw back the head, and to add greatly to the difficulty of refpiration, if not to produce actual fuffocation. Another improper practice is the precipitation with which the attendants *lay out* the body, immediately after death has taken place. They have often been known to ftrip the body in very cold ftormy weather, wrap it in cold linen, throw a fingle fheet over it, and open the doors and windows of the apartment, in little more than half an hour after a patient had died fuddenly.

It is too certain that the helplefs patient feels all thefe cruelties, after he has become unable to exprefs his fenfations diftinctly. The teftimony of perfons who have recovered from apparent death, leaves no doubt on this head. See a diftreffing cafe of this fort under the article CATALEPSY. But the means of prevention of fuch fuffering in the dying are eafy.

> "Difturb him not—let him pafs peaceably."
>
> Shakefpeare.

"When the toffing of the arms, which I have defcribed," fays Dr. Ferriar, "the rattling noife in refpiration, and difficulty of fwallowing have come on, all unneceffary noife and buftle about the dying perfon fhould be prohibited. The bed-curtains fhould be drawn nearly clofe, and unlefs the patient fhould place himfelf in a pofture evidently uneafy, he fhould be left undifturbed. Exclamations of grief, and the crowding of the family round the bed, only ferve to harrafs him. The common practice of plying him with liquors of different kinds, and of forcing them into his mouth, when he cannot fwallow, fhould be totally abftained from.

"When he no longer breathes, one perfon only fhould remain in the room, who fhould take care that no alteration be made in the ftate of the bed. Every thing fhould be conducted as if he were in a tranfitory fleep. If the weather be hot, the windows of the room may be opened, and the bed curtains undrawn in the courfe of two or three hours. In winter, it will be fufficient to withdraw the curtains within that time.

"There can be no juft reafon for the hafte, with which it is ufual to lay out the body. Several hours may be very properly fuffered to elapfe before this is done; for the joints do not commonly become rigid for a confiderable time. At the end of that period, the body will be completely cold, and all remains of fenfibility will have been extinguifhed." Ferriar on the Treatment of the Dying, loc. cit. vol. iii.

Thefe obfervations relate folely to the propriety of fmoothing the bed of death. For, happily, the ufage of keeping the body unburied during feveral days is fo firmly eftablifhed in this country, that it is unneceffary to fpeculate on the poffibility of abufes, in regard to premature interment. In France a very blameable, even criminal, degree of hafte feems to have been ufed in this refpect, at the time when Bruhier wrote. For he obferves, that the rituals, which were moft cautioufly drawn up, only enjoined the delay of interment for twenty-four hours after death, and that others directed it to be performed within half of that period. See his treatife de l'Incertitude des Signes de la Mort. The flighteft

flighteft appearance of beginning putrefaction affords fufficient fecurity againft any revifitings of life; and marks of this nature are almoft always vifible, before the date of interment obferved in this country.

DEATH, in *Theology*. The nature and extent of death, in its connection with the fall of our firft parents, and denounced as a penalty in confequence of their tranfgreffion, have afforded occafion for a difference of opinion among divines and biblical critics. It has been generally fuppofed that the privilege of continued life was connected by a divine conftitution with the innocence or finlefs obedience of the firft progenitors of our race; and that the providence of God would preferve and prolong their exiftence, notwithftanding thofe natural decays, and that tendency to diffolution, to which their natural frame muft neceffarily have been fubject. The tree of life, to which they had accefs, was either a pledge of permanent being and happinefs, or the appointed means of fecuring them; and the prohibition to abftain from the fruit of the tree of the knowledge of good and evil, was merely intended to prevent their forfeiture of happinefs, and the lofs of life, on which their happinefs depended. Jofephus, and fome of the ancients, abfurdly imagined, that this latter tree was fo called, becaufe there was fomething in its fruit that by its own nature conveyed knowledge or wifdom; but this is the effort of ftudy and inquiry, and not of eating or drinking, at leaft in any other way than by the experience it gives, and the effects it produces. In this fenfe eating indeed conveys a great deal of knowledge both of good and evil, inafmuch as the eating of noxious and poifonous food, or proper and wholefome food in an intemperate manner, will give a very fenfible knowledge of good, *viz.* of the value of the eafe and health that are loft, by the evil that it introduces. This, if we underftand the hiftory in a literal fenfe, (fee FALL,) may be the true reafon of the name of this tree, that of the knowledge of good and evil. Thus, the tree of life, and the tree of the knowledge of good and evil, feem to ftand in oppofition to each other, and to be of directly contrary qualities. The tree of life was certainly of an healing, reftorative nature, and would have prolonged life to the longeft period of duration. (See Gen. iii. 22, and Rev. xxii. 2, in which latter paffage this tree is alluded to.) In oppofition to this was the tree of the knowledge of good and evil, the fruit of which, however pleafing to the fight or grateful to the tafte, was of a pernicious and deadly quality, and tended to introduce thofe diforders in the body, which would eventually, and in their own nature, lead to and iffue in death. The prohibition of the fruit of this tree was juftly made by the great Creator and Lord of man, not merely for the exercife of his fovereign authority and power, but as an inftance of his goodnefs to, and care of, the new-formed creature he had placed in Eden, and in order to prevent him, through want of experience, from deftroying himfelf. The exception of this tree may be confidered partly as a friendly caution, and principally as an exprefs prohibition, carrying in it a pofitive injunction wholly to abftain from its fruit; and in this fenfe our firft parents underftood it. (Gen. iii. 1. 3.) The penalty threatened againft the violation of this prohibition is expreffed in thefe words, "thou fhalt furely die," or "in dying thou fhalt die:" a form of fpeaking which commonly has an emphatical meaning; fometimes denoting the abfolute certainty of any thing, and having in it the nature of a ftrong affirmation; and fometimes fignifying what is extraordinary in its kind, and the continuation of the thing fpoken of, and the gradual accomplifhment of it. "In the day thou eateft thereof, in dying thou fhalt die," *i. e.* inftantly become incurably mortal, and tending all thy days to diffolution and death.

Death, threatened as a penalty in confequence of fin, and contrafted againft the prefent life, bleft with all the comforts and privileges of it, and regarded as a defirable privilege, muft be a fubftantial punifhment, and an awful inftance of the divine difpleafure againft fin: and as the recovery to life is as far beyond the reach of the power of man, as the firft grant of it was, this threatening, "thou fhalt furely die," was not only a condemnation to certain death, but as to any thing man could do to prevent it, to perpetual and eternal death, and the entire and final lofs of life and happinefs. It has been abfurdly objected by fome to the truth of the fcripture hiftory, that the fentence of death was not executed immediately, or on the day of the trangreffion. But the expreffion, "in dying thou fhalt die," properly interpreted, furnifhes no ground for this objection: for it fignifies, thou fhalt certainly, but gradually die, inftantly become liable to death, and be perpetually tending to it, without any poffibility of a final reprieve, or knowing when the fentence fhall be executed in its full weight and extent. Some perfons have alfo objected to the equity of this fentence, or of the connection between the eating of the forbidden fruit and the punifhment of death that attended it. Dr. Chandler, in confidering this objection, (Sermons, vol. iv. p. 17, &c.) obferves, that as eating the forbidden fruit and the punifhment of death arofe out of the nature of things, and had the connection of caufe and effect, nothing more need be faid in vindication of it than for any other natural connection of this kind whatfoever. Befides, no creature has a right to life long, or upon any other terms than the Creator pleafes. Again, the nature of Adam's crime, when confidered in its proper view, will appear to be extraordinary, and his guilt attended with peculiar and heinous aggravations, and on fome accounts with unqueftionably much greater than ever was, or ever could be committed by any of his pofterity. His tranfgreffion was folly in its nature, and a high immorality of a moft enormous kind, and a fin immediately againft God, with the worft aggravations attending it. Moreover, it involved their pofterity to the end of time, through all ages and nations, in the confequences of it, and fubjected them to two of the greateft evils, fin and death. Farther, notwithftanding the objections that may be urged againft the credibility of this part of the fcripture hiftory, from the extraordinary conduct of God, and the feeming difproportion between the offence and the punifhment threatened to and inflicted upon it, yet there is in reality nothing extraordinary in it; nothing but what occurs in the common government of God, and what is allowed reafonable and fit, upon the principles of natural as well as revealed religion. The facred hiftory informs us, that our firft parents, by eating the forbidden fruit, *i. e.* by indulging their appetites contrary to their knowledge and conviction of duty, and by fuffering themfelves to be led away by the force and influence of temptation to tranfgrefs the law of God, by forfeiting their innocence, and fuffering inclination to fubdue the dictates of confcience, forfeited the favour of God, and fubjected themfelves to affliction, mifery, and death. And as far as this arofe from the natural connection of things, does not the fame connection ftill hold? Do not the fame criminal indulgences produce the fame effects? Moreover, one fevere and grievous part of the punifhment of our firft parents, their being prohibited accefs to the tree of life, and being irrecoverably given up to the condemnation of death, was, if the matter be rightly confidered, an act of

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real compaſſion and goodneſs on the part of God. A ſcheme of recovery was immediately commenced upon their tranſgreſſion, and they had evident intimations of mercy as ſoon as their ſentence of puniſhment was announced.

Several other learned writers underſtand by the penalty of death denounced againſt the tranſgreſſion of our firſt parents, not merely the ſeparation of the ſoul from the body, or its removal from one ſtate of conſciouſneſs to the other, but the utter extinction of the human being, or death eternal, without hopes of a revival or reſurrection. To this purpoſe Dr. Taylor obſerves, (Scripture Divinity, p. 102.) that every tranſgreſſor, the moment he is ſuch, is dead in law: and, for any thing in law, he muſt continue ſo as long as it is true, that he has violated the law, that is, for evermore. The language of the law to every one that tranſgreſſes it, and for every breach and tranſgreſſion, is this, "Thou ſhalt die." And this, he ſays, is the force of the expreſſion, מות תמות, "in dying thou ſhalt die," in the law given to Adam. It does not ſpeak of the certainty of the event, as if he ſhould certainly die the day he tranſgreſſed; for the event ſhews the contrary; nor that he ſhould become mortal from a change in his conſtitution, which is a random conjecture, without any foundation in the nature of his conſtitution, which was created mortal, or in the force of the words. For the phraſe מות תמות, is an Hebraiſm, importing that a thing is, or is done, thoroughly, totally, in the moſt perfect manner, or the moſt intenſe degree, and is to be interpreted according to the nature of the ſubject. (See Gen. ii. 16. xxxvii. 33. Exod. xxi. 19.) Thus the force of the words, "in dying thou ſhalt die," is this, thou ſhalt thoroughly, utterly, totally die, or die for ever, without coming to life again. Thou haſt juſtly forfeited thy life and being, and ſhalt ſuffer a total and eternal extinction of it. Athanaſius (De Incarn. Verbi) thinks, that the doubling of the expreſſion in the above cited ſentence, denotes, that "he ſhould not only die, but remain in the corruption of death;" as we ſhould all have done, if the ſecond Adam had not obtained for us a happy reſurrection. This ſurely, ſays biſhop Law (Conſiderations on the Theory of Religion, p. 348, ed. 7.), and nothing leſs, muſt be implied in that moſt ſolemn ſentence: nor can we well conceive the unhappy ſubjects of it to have been at that time ſo very ingenious as to explain it away, by diſtinguiſhing upon the ſeveral component parts of their conſtitution; and concluding, that by death no more was intended, than only a ſeparation of theſe parts, while the principal of them was ſtill living in ſome different manner: or that it was a continuation of their conſciouſneſs, and real exiſtence, though in ſome other place. This, he ſays, was the philoſophy of after ages. Dr. Jortin alſo once held a ſimilar opinion (Serm. vol. vii. p. 283), though he afterwards adopted the contrary doctrine. If death, ſays the learned prelate (ubi ſupra), be a return to duſt, then nothing but a reviving, or a reſuſcitation from that duſt, can be the reverſing of it, or a proper recovery from it; and accordingly, as he conceives, to this, and this alone, St. Paul confines the contraſt, he has drawn at large, between the firſt and ſecond Adam: "Since by man came death, by man came alſo the reſurrection from the dead; and as in Adam all die, even ſo in Chriſt ſhall all be made alive;" which words directly affirm, ſays Taylor (Doctr. of Orig. Sin, p. 24.), "that a reſurrection, or body made alive again, is granted, aſſured, and executed by and in Chriſt alone," and evidently ſuppoſe, that the dead are not made alive till the reſurrection; and that if a reſurrection had not been provided, we ſhould never after death have been made alive. Biſhop Sherlock purſues the ſame kind of reaſoning in ſimilar language. (Diſc. ii. p. 76. 300. Diſc. vi. p. 209. Uſe and Intent of Prophecy, p. 69, &c. ed. 2.) The ſame notion of death, and of an unconſcious ſtate between death and the reſurrection, is adopted by Dr. Prieſtley, in conformity to his ideas of the homogeneity of man, and inculcated in his Inſtitutes and various other writings.

An ingenious writer, and an excellent Biblical critic, however, is of a very different opinion; and he deduces, from the antiquity of the worſhip of dead men, an explication of the term death in the threatening denounced againſt Adam, ſimilar to that with which we have introduced this ſubject, conformable to his idea of the ſoul, as a ſubſtance or principle diſtinct from matter and the body, and conſiſtent with his belief of a ſeparate ſtate. For an abſtract of his reaſoning on this intereſting ſubject, ſee Sleep *of the Soul.* See alſo Soul and Resurrection.

Death, in its original and moſt proper and natural ſenſe, ſignifies, as we have ſhewn, the loſs of life, and together with it, of all its bleſſings and comforts. This is the common, if not the univerſal, ſenſe of the word in the writings of Moſes; and in the ſanction of a law, it is reaſonable to ſuppoſe the word is uſed in its moſt natural and proper ſenſe. Death, in Scripture, is uſed ſometimes for the loſs of privileges, benefits, and comforts, even when life remains. In this ſenſe it ſignifies the ſoul's loſs of the image of God, of holineſs, and peace; this is called "ſpiritual death." Thus the Epheſians are ſaid to be "dead in treſpaſſes and ſins." (Epheſ. ii. 1.) Sometimes death ſignifies the loſs of bleſſings in the world to come, together with poſitive ſufferings both in ſoul and body. Thus, in Rom. viii. 13. "if ye live after the fleſh, ye ſhall die." (See John vi. 50.) In Rev. xxi. 18. this is called "the ſecond death:" and ſome have ſuppoſed, that it denotes the final deſtruction of the incorrigibly wicked, whom neither milder nor more ſevere diſcipline can reform, and render capable of the happineſs connected with piety and virtue.

Death, *Mors*, in *Mythology*, a divinity, which, according to the theogony of Heſiod, was the offspring of Night, and whoſe brother was Sleep. (See Sleep.) The Greek poets, as well as the Latins, and Virgil (Æn. l. 2.) among others, reckon death among their gods. It is not known what worſhip they paid her; but it is certain that the Lacedæmonians honoured her as a divinity, and had, as Pauſanias informs us, (in Lacon.) one of her ſtatues near that of her brother Sleep. Mors, or Death, was the moſt powerful miniſter of the infernal deities, and brings all mortals down to the river Acheron. It is ſaid that her mother Nox, or Night, beſtowed peculiar care on her education, and that ſhe had a great affection for her brother Somnus, or Sleep. Among the Elæans there was a temple, with the ſtatue of a woman holding in either hand a ſleeping boy, with their legs diſtorted; that in her right was white, to ſignify Sleep; that in her left was black, to repreſent Death; whilſt the female that foſtered them was Night. No ſacrifices, no temples, no ceremonies, no prieſts, were appointed for death, becauſe ſhe was looked upon as an inexorable deity, whom no prayers could move, nor ſacrifices pacify. The figures of Mors, or Death, are, as Mr Spence ſays, very uncommon, as were thoſe of the evil and hurtful beings in general; they were excluded from all medals; on ſeals and rings they were probably conſidered as bad omens, and were perhaps never uſed. Among the few figures of Mors met with by this ingenious writer, that in the Florentine gallery was the moſt remarkable; it is a little figure, in braſs, of a ſkeleton, ſitting on the

the ground, and refting one of his hands on a long urn. The figure of Mors might have been very common in ancient paintings, becaufe fhe is frequently mentioned by the Roman poets, who diftinguifhed her from Lethum. The latter was that general caufe or fource of mortality, which they fuppofed to have its proper refidence in hell, and Mors or Mortes, for they had feveral of them, they regarded as the immediate caufe of each particular inftance of mortality that occured on our earth. The face of Mors feems in their reprefentation of it, to have been of a pale, wan, dead colour. The poets defcribe her, as ravenous, treacherous, and furious. They defcribe her as roving about open-mouthed, and as ready to fwallow up all that came in her way; they feem to give her black robes and dark wings, and reprefent her often as of an enormous fize. Statius gives her arms and a fword, exhibiting her like a deftroying angel, where he is defcribing a peftilence. The ancient poets fometimes reprefent her as coming to the doors of mortals, and thundering at them, to demand the debts they owe her: fometimes approaching to their bedfides, and leaning over them: and at other times, purfuing her prey, or hovering in the air, and ready to ftoop upon it. She is alfo reprefented as purfuing men with a net, catching them, and dragging them to their tombs. Of all the pictures of this deity exhibited by Statius, the moft particular is that which reprefents her as ftanding by the bed-fide of a youth juft in the flower of his age, accompanied by Envy and Vengeance. Thefe horrid deities manifeft great friendfhip to one another in the execution of their cruel offices, and Vengeance, in particular, after having embraced the goddefs of death, feems, according to his account, to take the fatal net out of her hand, and to perform her office for her.

Death, *Appeal of*, in *Law*. See Appeal *of death*.

Death, *Civil*. The law diftinguifhes between natural and civil death: the former is the actual termination of life; the latter, when a perfon is not actually dead, but adjudged fo by law. Thus, by ftat. 19. Char. II. c. 6., if a perfon for whofe life an eftate is granted remain beyond fea, or is otherwife abfent feven years, and no proof be made of his being alive, or becomes a profeffed monk, he fhall be accounted naturally dead. However, the latter difability, fince the Reformation, is held to be abolifhed. But if the party beyond fea be afterwards proved living at the time of eviction of any perfon, then the tenant, &c. may re-enter and recover the profits. By ftat. 6. Ann. 1. 18., perfons in reverfion or remainder, after the death of another, upon affidavit that they have caufe to believe fuch other dead, may move the lord chancellor to order the perfon to be produced; and if he be not produced, he fhall be taken as dead; and thofe claiming may enter. See Civil *Death*.

Death-*Watch*, in *Zoology*, the Englifh name of the *pediculus* of old wood, a fpecies of the *termes*, belonging to the order of aptera and clafs of infects in the Linnæan fyftem. (See Termes.) It is nearly of the fize of the common loufe; and the noife refembling the beating of a watch is made by the male or female, when wooing each other This ticking noife the populace have long taken for a prefage of death, in the family where it is heard: whence it is alfo called pediculus fatidicus, mortifaga, pulfatorius, &c.

There are two kinds of *death-watches*: of the firft we have a good account in the Philofophical Tranfactions, by Mr. Allen. It is a fmall beetle, five fixteenths of an inch long, of a dark brown colour, fpotted; having pellucid wings under the vaginæ, a large cap, or helmet, on the head, and two antennæ proceeding from beneath the eyes. The part with which it beats, he obferved, was the extreme edge of the face, which he choofes to call the upper lip; the mouth being protracted by this bony part, and lying underneath, out of view.

This account is confirmed by Mr. Derham, with this difference, that, inftead of ticking with the upper lip, he obferved the infect to draw back its mouth, and beat with its forehead. That author had two death-watches, a male and female, which he kept alive in a box, feveral months; and could bring one of them to beat whenever he pleafed, by imitating its beating: and by this ticking noife he could frequently invite the male to get up upon the other, in the way of coition. When the male found he got up in vain, he would get off again, beat very eagerly, and then up again: whence the ingenious author concludes thofe pulfations to be the way whereby thofe infects woo one another, and find out, and invite each other to copulation.

The fecond kind of death-watch is an infect in appearance quite different from the firft. The former only beats feven or eight ftrokes at a time, and quicker: the latter will beat fome hours together, without intermiffion; and his ftrokes are more leifurely, and like the beat of a watch. This latter is a fmall greyifh infect, much like a loufe when viewed with the naked eye. The ticking, as in the other, is a wooing act.

This infect is at firft a minute white egg, much fmaller than the nits of lice; though the infect is near as big as a loufe. In March it is hatched, and creeps about with its fhell on. When it firft leaves its fhell, it is even fmaller than its egg; though that be fcarce difcernible without a microfcope. In this ftate it is fomewhat like the mites in cheefe: from this fmall ftate they grow gradually to their mature or perfect fize: when they become like the old one, they at firft run about much more fwiftly than before. Philofoph. Tranf. abr. vol. v. p. 26, &c.

The minute infect, which has been long known under the name of the death-watch, has been thus noticed by Linnæus: "frequens in domibus, invifum veftibus, herbariis, inftitorum mufeis. Fœmina horologii inftar pulfatoria feftucis, (Syft. Nat. p. 1015, No. 2.) Geoffroy, however, fays, he is confident that it is not from this infect, but from the "dermes domefticus," (Syft. Nat. p. 563, No. 12.) which makes the circular holes in furniture, that the ticking noife proceeds. (Hift. des Infectes, tom. i. p. 3. and tom. ii. p. 602.) Neither of thefe is larger than the pediculus humanus. Dr. Shaw affures us, that the infect properly called the death-watch is a coleopterous infect of the genus "ptinus." (Syft. Nat. p. 565.) He fays it is chiefly in the advanced ftate of the fpring that this alarming little infect commences its found; the prevailing number of diftinct ftrokes is from 7 to 9 or 11; thefe are given in pretty quick fucceffion, and are repeated at uncertain intervals; and in old houfes, where the infects are numerous, they may be heard almoft every hour of the day, efpecially if the weather be warm. The found exactly refembles that which may be made by beating moderately hard with the nail on a table. The infect is about a quarter of an inch in length. This ingenious and accurate naturalift has diftinguifhed the infect by the name of "ptinus fatidicus," the beating ptinus, and fuppofes it to be the fame with the "dermeftes teffelatus" of Fabricius, and the "ptinus pulfator" of Gmelin. He alfo cautions us not to confound this infect, which is the real death-watch of the vulgar, emphatically fo called, with another infect, which makes a found like the ticking of a watch, and which continues its found for a long time without intermiffion: it belongs to a totally different tribe from the death-watch, and is the "termes pulfatorium" of Linnæus. (Nat. Mifc. vol. iii.) Whichfoever of the infects above defcribed is the real death-watch, it is well known that

that for a feries of years the dread of it has excited very uneafy fenfations in the minds of the weak and fuperftitious; an unhappy prejudice which exifts even to the prefent day, and cannot be totally eradicated by all the powers of reafon and argument. Sir Thomas Brown (Pfeudo-doxia Epidemica, b. ii. c. 7.) long ago obferved, "he that could extinguifh the terrifying apprehenfions hereof, might prevent the paffions of the heart, and many cold fweats in grandmothers and nurfes." With the feelings of thefe perfons, a well-known fatirift fports in the following lines:

——— "a wood-worm
That lies in old wood, like a hare in her form:
With teeth or with claws it will bite or will fcratch,
And chamber-maids chriften this worm a DEATH-WATCH:
Becaufe like a watch, it always cries click,
Then woe be to thofe in the houfe, who are fick,
For fure as a gun, they will give up the ghoft,
If the maggot cries click, when it fcratches the poft."

DEATH'S *Head*, or *Human Skull*, in *Heraldry*, is often borne in arms, and thus generally blazoned. An order of knighthood under this appellation was inftituted in Silefia, by Silvius Nimrod, duke of Wurtemberg, in 1652, for men and women; and revived in the year 1709, by Louifa Elizabeth, widow of Philip, duke of Saxe-Mafburg, and youngeft daughter of the founder. The enfign of this order is a death's head enamelled white, furmounted with a crofs pattée fable; above the crofs pattée another crofs, compofed of five large jewels, by which it hangs to a black ribbon, edged with white;—on the ribbon is this motto—MEMENTO MORI.

DEBA, in *Ancient Geography*, a river of Syria, which has its fource to the north in the mountains, about lat. 39°, and running S.W. difcharges itfelf into the Euphrates about lat. 37° 45′.

DEBA, a town of Afia in Syria, fituated in Comagené, upon a ftream, to the S.W. of Doliche, and W. of Zeugma, about lat. 36° 25′.—Alfo, a town of Afia, in Mefopotamia, fituated on the Tigris. Ptolemy.

DEBALPOUR, in *Geography*, a town of Hindooftan, and capital of a diftrict in the country of Moultan, fituated on the great road from Delhi to Moultan; 70 miles S.E. of Lahore, and 150 E. of Moultan.—Alfo a town of Hindooftan, in the Malwa country; 21 miles W. of Endore, and 13 S. of Ougein.

DEBEN, a river of England, in the county of Suffolk, which rifes near Debenham, and runs into the fea near Harwich. This river is navigable from its mouth to the town of Woodbridge. See CANAL.

DE BENE ESSE, a Latin phrafe ufed in our law-books. To take, or do, a thing de bene effe, is to accept, or allow it as well done for the prefent; but when it comes to be more fully examined, or tried, to ftand or fall, to be allowed or difallowed, according to the merit or well-being, of the thing in its own nature; or, as we fay, "Valeat quantum valere poteft."

Thus, in chancery, upon motion to have one of the lefs principal defendants in a caufe examined as a witnefs, the court (not then thoroughly examining the juftice of it, or not hearing what may be objected on the other fide) often orders fuch a defendant to be examined de bene effe, *i. e.* that his depofitions fhall be allowed, or fuppreffed, at the hearing of the caufe upon a full debate of the matter, as the court fhall think fit; but for the prefent they have a well-being, or conditional allowance. 3 Cro. 68. When a complainant's witneffes are aged or fick, or going beyond fea, and the plaintiff is in danger of lofing their teftimony, the court will order them to be examined de bene effe; fo as to be valid if the plaintiff hath not an opportunity to examine them afterwards; as if they die before anfwer, or do not return, &c. In either of thefe cafes the depofitions may be ufed in the court of chancery, or at law. Thus alfo in common law, the judges often take bail de bene effe, to be allowed or rejected upon the approbation or exception of the plaintiff's attorney. Declarations likewife are fometimes delivered de bene effe.

DEBENHAM, in *Geography*, a market town in the hundred of Thredling, in the county of Suffolk, England; is diftant from Ipfwich 12 miles, and 82 from London. It is fituated on the fide of a hill, which declines to the river Deben. The church is a handfome ftructure, and the market houfe a good building. Here is a free fchool founded by fir Robert Hitcham. In the year 1744, the town fuffered feverely by fire. It has a fmall-market on Fridays, and one annual fair on the 24th of June. The number of houfes appears, by the returns made under the late act, to have been 392, and of inhabitants 1215.

DEBENTURE, a public written acknowledgment of money due, for value received or fervices performed, fomewhat fimilar to a bond. They were firft iffued in this country in 1649, by the commonwealth, for fecuring to the foldiers, or their affigns, the fums due to them for pay, upon the accounts being audited; and they have been fince iffued to the army, purfuant to feveral acts of parliament, likewife to the fervants of the king's houfhold for falaries, board-wages, &c.

In 1700, the debentures which had been iffued for arrears due to the officers of the army, and for tranfport fervice, and for clothing the army, were directed to be taken as fterling money, in purchafes of the forfeited eftates in Ireland of perfons convicted of treafon; but this provifion being infufficient, 5 *per cent.* intereft was allowed on the debentures, till the principal part of them was fubfcribed into the original capital of the South Sea company.

In 1711 debentures were iffued by the commiffioners for trade and plantations, to the proprietors and inhabitants of the iflands of St. Chriftopher and Nevis, who had fuffered greatly by the invafion of the French, in 1705. Thefe debentures carried 6 *per cent.* intereft, but it was not paid very regularly: a part of them was paid off, and the remainder fubfcribed into 3 *per cent.* ftock.

Debentures have fince been occafionally iffued for temporary purpofes; thus, after the conclufion of the American war, compenfations were granted to fuch perfons as had been fufferers from their attachment to the Britifh government, who, upon their claims being inveftigated, received debentures bearing $3\frac{1}{2}$ *per cent.* intereft, afterwards commonly called loyalift debentures, which in the whole amounted to about £2,000,000, and were gradually difcharged at fubfequent periods.

Debentures are iffued by the Board of Ordnance to perfons contracting for ftores, or other articles, in that department. They are not payable at any fixed period, and as they do not bear intereft, thofe who have occafion to difpofe of them are generally obliged to fell them at a difcount, which has fometimes been very confiderable. In the years 1784 and 1785, it was thought proper to provide for the principal part of the ordnance debentures then outftanding, by funding them in 5 *per cent.* ftock.

DEBENTURE, in *Commerce*, a certificate iffued by the officers of the cuftoms, entitling the exporter of goods to a bounty or drawback of duty, purfuant to act of parliament. In order to obtain the debenture, it is neceffary, with refpect to foreign produce, to trace the articles on which the allowance

allowance is claimed through all the different hands into which they have paſſed ſince their importation, in order to prove that the duty has been actually paid thereon; the exporter is likewiſe required to give a bond, as ſecurity that the goods ſhall not be re-landed in any part of the United Kingdom.

Debentures, whether for a drawback or a bounty, undergo a variety of formalities and examinations, and muſt have a number of ſignatures to render them complete. They are made out by the collector outwards; thoſe for drawbacks from a certificate ſigned by the clerk of the certificates that the duties under their ſeveral branches upon the articles entered for exportation therein enumerated, have been paid; thoſe for bounties, from the bond given by the merchant for the exportation of the goods ſpecified in the entry. The goods on which either the drawback or the bounty is computed, are thoſe certified by the ſearchers to have been actually ſhipped. On a debenture for a drawback, the duties to be paid back are computed, and endorſed in figures, by the clerk of the rates; the controller checks this computation. The examiner computes, and inſerts them in figures upon the back of the debenture, with the titles of the different branches, and the amount in words at length. On a debenture for a bounty, the collector outwards, computes, and enters, at different times, the ſeveral branches, with the amount in figures and in words at length: the controller, ſurveyor, and ſurveyor general, ſucceſſively check this computation.

Debentures, like moſt other public documents, are liable to a ſtamp duty.

DEBET, among *Book-keepers*, is uſed to expreſs the left-hand page of the ledger, to which are carried all articles ſupplied or paid, on the ſubject of an account.

Debet et Detinet, in *Law*, are Latin words, denoting, *he oweth and detaineth*, uſed in the bringing of writs and actions; and an action ſhall always be in the debet et detinet, when he who makes a bargain or contract, or lent money to another, or he to whom a bond is made, bringeth the action againſt him who is bounden, or party to the contract and bargain, or unto the lending of the money, &c. But if a man ſells to another a horſe, &c. if he brings debt for the horſe, the writ muſt be in the detinet only. New. Nat. Br. 265.

Debet et Solet, are alſo formal words made uſe of in writs; and ſome writs have theſe words in them, which ought not to be omitted. Likewiſe, according to the diverſity of the caſe, both debet et ſolet are uſed, or debet alone: as a quod permittat may be in the debet et ſolet, or in the debet only, as the demandant claims. And if a perſon ſues to recover any right, whereof his anceſtor was diſſeiſed, by the tenant or his anceſtor, then he uſeth the word debet alone in his writ, becauſe his anceſtor only was diſſeiſed, and the eſtate diſcontinued: but if he ſue for any thing that is now firſt of all denied him, then he uſeth debet et ſolet, becauſe his anceſtor before him, and he himſelf uſually enjoyed the thing ſued for, until the preſent refuſal of the tenant. Reg. Orig. 140. The writ of ſecta molendini is a writ of right in the debet et ſolet, &c. F. N. B. 98.

DEBILITY, in *Medicine*, is a term of ſomewhat extenſive application, being uſed by medical writers, not only to denote the diminution of the muſcular powers of the body, but alſo to deſignate the failure of the due performance of the functions in all the organs reſpectively.

Thus Dr. Cullen, treating of fever, obſerves, that the ſymptoms, which denote a great degree of debility, are, in the *animal* functions; the weakneſs of the voluntary motions; the irregularity of the voluntary motions, depending on their debility; the weakneſs of ſenſation; the weakneſs and irregularity of the intellectual operations:—in the *vital* functions; the weakneſs of the pulſe; the coldneſs or ſhrinking of the extremities; the tendency to a deliquium animi, in an erect poſture; the weakneſs of reſpiration:—in the *natural* functions; the weakneſs of the ſtomach, as appearing in anorexia, nauſea, and vomiting; involuntary excretions, depending on a palſy of the ſphincters; and difficult deglutition, depending on a palſy of the muſcles of the fauces. Firſt Lines, § 104.

The term debility is alſo applied to every diminution of the powers of the ſyſtem, although originating in circumſtances altogether different in their nature. The weakneſs, for example, which ſucceeds acute diſeaſes, or which is produced by ſpare diet, or other means of privation of the ſupport of the body; and the loſs of ſtrength which is occaſioned by the operation of contagion, or other cauſes of fever, and of narcotic ſubſtances, which ſuddenly impair the energy of the brain, are both denominated debility. The latter ſtate has, however, by ſome writers, been termed, proſtration of ſtrength, to diſtinguiſh it from the actual loſs of the ſubſtance of the body, which accompanies the former.

Debility holds an important ſtation in the ſyſtem of Dr. Brown, commonly called the Brunonian ſyſtem, in which it is uſed in a peculiar acceptation. Debility, according to Brown's hypotheſis, is the cauſe of all diſeaſes, and is of two kinds, which he terms *direct* and *indirect* debility. As health conſiſts of a proper balance of ſtimuli, with excitability of the animal body, according to this hypotheſis; ſo, when the ſtimuli are in proportion too powerful, the excitability is exhauſted and *indirect* debility enſues; and when the ſtimulation is proportionately too feeble, the excitability is accumulated, and debility is the conſequence; which is called *direct* debility; becauſe it is not produced by any poſitive noxious power, but by a ſubduction of the things neceſſary to ſupport life." Brown's Elements of Medicine, chap. iii. § 45.

Dr. Darwin has placed theſe two conditions of the body in a ſimilar light, in his Zoonomia. If the quantity of ſenſorial power, he obſerves, remains the ſame, and the quantity of ſtimulus be leſſened, a weakneſs of the fibrous contractions enſues, which may be denominated *debility from defect of ſtimulus*. If the quantity of ſtimulus remains the ſame, and the quantity of ſenſorial power be leſſened, another kind of weakneſs enſues, which may be termed *debility from defect of ſenſorial power*: the former is the direct debility, the latter the indirect debility of Dr. Brown. See Zoonomia, vol. i. ſect. xii. 2. 1.

The ſubjects of direct debility, or debility from defect of ſtimulus, are perſons in a ſtate of inanition, from hunger; or who have been expoſed to ſevere cold, which is, in fact, an abſtraction of the ſtimulus of heat. On the contrary, thoſe perſons ſuffer indirect debility, or debility from exhauſtion of the ſenſorial power, who have been over ſtimulated: as thoſe who have experienced a debauch, from exceſſive potation of wine the preceding night; or thoſe who have been expoſed to exceſſive heat. Habitual drunkards ſuffer under this ſpecies of debility every morning, before they take their uſual potation, as is evinced by the tremors of their hands, their lowneſs of ſpirits, &c.

Through the whole progreſs of *indirect debility*, ſays Dr. Brown, the ſecond application of every ſtimulus has leſs effect than the firſt, the third leſs than the ſecond, and ſo forth to the laſt, which produces no more excitement; this effect takes place in proportion to the degree or duration of the ſeveral applications, though each gives ſome excitement.

Hence before the eſtabliſhment of indirect debility, and juſt as it is upon the eve of being eſtabliſhed, the ſtimulus, which is producing it, ſhould be withdrawn; a debilitating power ſhould be applied; as in giving over drinking wine at the

the end of an entertainment, and fubftituting water in its place, or applying cold to a perfon who has been expofed to an exceffive degree of heat. The progrefs to indirect debility is alfo retarded by diminifhing the excitement from time to time, and proportionately increafing the excitability, and thereby giving more effect to the action of ftimuli.

In the cure of indirect debility, whatever be its degree, and from whatever fort of exceffive ftimulus it has arifen, little lefs of the ftimulus, which is to be employed as the chief remedy, than that, which produced the difeafe, fhould at firft be ufed; and then lefs and lefs, till the difeafe is cured. Thus a man who has injured his conftitution by the abufe of fpirituous liquors, is not fuddenly to be reduced to water alone, as is the practice of fome, but he is to be treated, as the judicious Dr. Pitcairn, of Edinburgh, is faid to have treated a highland chieftain, who applied to him for advice in this fituation. The doctor gave him no medicines, and only exacted a promife from him, that he would every day put in as much wax into the wooden *queich*, out of which he drank his whifkey, as would receive the impreffion of his arms. The wax thus gradually accumulating, diminifhed daily the quantity of the whifkey, till the whole *queich* was filled with wax; and the chieftain was thus gradually, and without injury to his conftitution, cured of the habit of drinking fpirits.

The cure of the hurtful effect of any ftimulus, fhould be firft fet about by changing it for a lefs; this for a ftill lefs; and the intention of cure fhould be always to pafs from the ufe of the more violent and diffufible, which nature in her healthy ftate rejects, to that of the more durable, till the healthy ftate can at laft be maintained by the ufual means.

Through the whole courfe of *direct debility*, or debility from defect of ftimulus, every deficiency of ftimulus is increafed by a fecond, the fecond by a third, the third by a fourth, till the effect at laft comes to be a ceffation of any further excitement. Excitement, therefore, in fuch cafes, is never to be leffened, and debility increafed, with the view of giving greater effect to a new ftimulus, by accumulating excitability. For as often as this is put in practice, the morbid ftate is increafed; and, if the debility fhould happen to be great, any further increafe may induce death, but will never increafe the ftrength. For the cure of direct debility, we fhould begin with the fmalleft degree of ftimulus, and then rife to the ufe of a greater and greater, till the morbid abundance of excitability be gradually worn off, and health at laft reftored.

This may be illuftrated in the effects of intenfe cold, or abftraction of heat. When a limb is benumbed by cold, if heat be fuddenly applied a fevere pain is produced, which, if the ftimulus of heat be continued, will be followed by violent inflammation, terminating in mortification; the direct debility being fuddenly converted into indirect debility by over-ftimulation, while the excitability was redundant. The fafeft mode of reftoring a froft-bitten limb is to begin with the loweft degree of ftimulus, fuch as gentle friction with fnow, and gradually proceed to warmer applications, as the excitability diminifhes, until it is reduced to the ufual ftandard, and can bear the ufual ftimuli. This is the practice of the Ruffians, and the inhabitants of cold countries in general. See COLD.

The phenomena of ftarvation from want of food alfo illuftrate this fubject. It has been found by experience to be abfolutely neceffary to begin the ufe of aliment in the moft cautious manner, otherwife inflammation of the ftomach is the confequence. Food, not only the moft fparing in quantity, but of the mildeft and leaft ftimulating nature, is to be firft adminiftered, to be repeated at fhort intervals, and gradually increafed both in quantity and nutritious quality; by which means the powers of the ftomach are at length brought back to bear the ufual ftimuli.

Thus far the theory of direct and indirect debility is the refult of a correct generalization of facts, and ferves us as a fundamental principle in the treatment of many morbid conditions of the human conftitution. But in attempting to extend it, as the bafis of an explanation of all diforders, the Brunonians have quitted the path of induction, and fubftituted analogies of their own creation, for thofe which they ought to have found in the phenomena of nature. See EXCITABILITY.

DEBIN, in *Geography*, a town of Arabia, in the country of Yemen, 38 miles E. of Chamir.

DEBIR, in *Ancient Geography*, called *Kirjath fepher*, the city of letters, and *Kirjath-arba*, a city of Judah, near Hebron. It was taken by Jofhua, and fell by lot to Caleb. It belonged to the Levites, Jofh. x. 39. xii. 13. xv. 15, 16. xxi. 15. 1 Chron. vi. 58.—Alfo, a town of Gad, beyond Jordan, Jofh. xiii. 26.—Alfo, a city of Benjamin, which had belonged to Judah, Jofh. xv. 17.

DEBIS, in *Mythology*, a Japanefe idol, reprefented under a human form of gigantic ftature, as an image of brafs, placed on the moft confpicuous part of a high road, without a temple or pagoda. The young women who vifit this idol in order to be informed when they fhall have hufbands, receive an anfwer from a prieft who is placed in the hollow of it. Some gratuity is expected in confequence of this fuppofed communication with the god.

DEBLATHAIM, in *Ancient Geography*, a town which belonged to the Moabites, and the ruin of which was predicted by Jeremiah. Ch. xlviii. v. 2.

DEBLAW, in *Geography*, a town of Bohemia, in the circle of Chrudim; 4 miles S. S. W. of Chrudim.

DEBORAH and BARAK, a female and a male judge of Ifrael, who, after Sifera, general of the Canaanites, was defeated and flain by Jael, fung a hymn or canticle of thankfgiving. B. C. 1285.

DEBORUS, in *Ancient Geography*, a town of Macedonia, in Pæonia; called by Thycydides *Doberus*.

DEBRA LIBANO, in *Geography*, a town of Abyffinia; 180 miles S. of Gondar.

DEBRA SELALO, a town of Abyffinia; 90 miles S. W. of Gondar.

DEBRA SEMONA, a town of Abyffinia; 110 miles S. of Gondar.

DEBRETZIN, DEBREZEN, DEBRECHEN, DEBRECINUM, a large and populous town of Auftria, in Upper Hungary, in the county of Bihar, 54 miles S. E. of Tokay; 54 miles N. of Great Waradin; 105 miles E. of Buda. N. lat. 47° 30′.

Debretzin, though it has the title and privileges of a town, muft be confidered as a village, and then it is perhaps the greateft village in Europe, as it contains 30,000 inhabitants. But fhould it be confidered as a town, it is one of the worft, though its inhabitants are not poor. It is furrounded with a hedge, and the town gates are like Englifh field gates, ftuck with thorns and brambles. The houfes, with only a few exceptions, confift merely of the ground floor; they are thatched, and have the gable-end turned towards the ftreet. The ftreets are not paved, but in a few of the moft frequented balks are laid down in the middle for the foot paffengers.

By far the greateft part of the inhabitants are Calvinifts. Their principal college is at Debretzin. The building is irregular, old and decaying. The ftudents are very numerous.

Debretzin is famous for its foap manufacture, its bread, a woollen

woollen cloth called *guba*, its pipes, and its quarterly fairs. The foap is fent all over Hungary, and even to foreign countries. It is made from natural mineral alkali or natron, called fzekfo. This is found as an efflorefcence on a fandy foil in many parts of Hungary, but particularly about a lake near Kif-maria, which is only a few miles from Debretzin. It is not purified, nor does it undergo any operation before it is ufed.

There is alfo near Debretzin an imperial faltpetre manufactory, and juft without the town there are a few vineyards, but they yield a very poor wine.

Debretzin is alfo remarkable for its horned cattle. As a proof of the greatnefs of its herds, Korabinfky mentions in his Lexicon, that a certain biro is faid often to have driven ten thoufand head of cattle upon the neighbouring common; and that in the year 1739, when, on account of the feverity and length of the winter, a fcarcity of fodder prevailed, and more than eight thoufand were flaughtered; they were never miffed. Dr. Robert Townfon's Travels in Hungary, chap. ix.

DEBREW, a fmall town of Hungary, famous for its tobacco leaves, which generally fell 12 or 15 per cent. higher than any other Hungarian tobacco.

DEBRUIZED, or DEBRUISED, in *Heraldry*, is when we would intimate the grievous reftraint of any animal, which is debarred its natural freedom by any of the ordinaries being laid over it.

Thus when a pale, &c. is borne upon a beaft in an efcutcheon, the beaft is faid to be *debruifed* by the pale.

DEBT, a thing due to another, whether it confift of money, goods, or fervices.

The legal acceptation of debt is a fum of money due by certain and exprefs agreement: as, by a bond for a determinate fum; a bill or note; a fpecial bargain; or a rent referved on a leafe, that is fixed and unalterable. The non-payment of thefe is an injury, for which the proper remedy is by action of debt, to compel the performance of the contract, and recover the fpecific fum that is due.

This is the fhorteft and fureft remedy; particularly where the debt arifes upon a fpecialty, that is, upon a deed or inftrument under feal. Thus alfo, if I verbally agree to pay a man a certain price for a certain parcel of goods, and fail in the performance, an action of debt lies againft me; for this is a determinate contract; but if I agree for no fettled price, I am not liable to an action of debt, but a fpecial action on the cafe, according to the nature of my contract. Actions of debt are now feldom brought but upon fpecial contracts under feal, in which the fum is clearly and precifely expreffed; for in cafe of fuch an action upon a fimple contract, the plaintiff labours under two difficulties: 1ft, the defendant hath here the fame advantage as in action of *detinue*, that of waging his law, or purging himfelf of the debt by oath, if he thinks proper (4 Rep. 94.); 2dly, in an action of debt the plaintiff muft prove the whole debt he claims, or recover nothing at all. For the debt is one fingle caufe of action, fixed and determined; and which therefore, if the proof varies from the claim, cannot be looked upon as the fame contract, the performance of which it fues for. However, in actions of debt, where the contract is proved or admitted, if the defendant can fhew that he has difcharged any part of it, the plaintiff fhall recover the refidue. 1 Roll. Rep. 257. Salk. 664. The various cafes in which action of debt lies are too numerous to be here recited. (See Jacob's Law Dict. by Tomlins, art. *Debt.*)

The form of the writ of debt is fometimes in the *debet* and *detinet*, and fometimes in the *detinet* only; that is, the writ ftates, either that the defendant owes and unjuftly detains the debt or thing in queftion, or only that he unjuftly detains it. It is brought in the *debet* as well as *detinet*, when fued by one of the original contracting parties, who perfonally gave the credit, againft the other who perfonally incurred the debt, or againft his heirs, if they are bound to the payment; as by the obligee againft the obligor, the landlord againft the tenant, &c. But, if it be brought by or againft an executor, for a debt due to or from the teftator, this not being his own debt, fhall be fued for in the *detinet* only. (F. N. B. 119.) So alfo, if the action be for goods, for corn, or an horfe, the writ fhall be in the *detinet* only; for nothing but a fum of money, for which I (or my anceftors in my name) have perfonally contracted, is properly confidered as my debt. And, indeed, a writ of debt in the *detinet* only, for goods and chattels, is neither more nor lefs than a mere writ of *detinet*; and is followed by the fame judgment. Raft. Entr. 174.

By our law, debts due to the king are to be fatisfied in the firft place in all cafes of executorfhip, and adminiftratorfhip; and till the king's debt be fatisfied, he may protect the debtor from the arreft of any other creditor. At the common law, debt lies not for rent upon a leafe for life, though it doth on a leafe for years; but the remedy is affife, if the plaintiff have feifin, or by diftrefs. (3 Rep. 65.) But by ftat. 8 Anne, c. 17. any perfon having rent in arrear, upon any leafe for life or lives, may bring action of debt for fuch rent, as where rent is due on a leafe for years. Action of debt will lie againft a leffee, for rent due after the affignment of the leafe; for the perfonal privity of contract remains, notwithftanding the privity of eftate is gone. (3 Rep. 22.) But after the death of the leffee, it is then a real contract, and runs with the land. Cro. Eliz. 555.

It behoves an executor or adminiftrator to pay regard to the priority of debts in difcharging them; otherwife, on deficiency of affets, he muft anfwer thofe of a higher nature out of his own eftate: fuch are funeral charges, and expence of proving the will; debts to the king on record or fpecialty; debts, which by particular ftatutes are to be preferred to all others, as forfeiture for not burying in woollen, money due on poor's rates, letters to the poft office, and fome others; debts of record, as judgments, ftatutes, and recognizances; debts due on fpecial contracts, as for rent, on bonds, covenants, &c. under feal; and laftly, debts on fimple contracts, as notes and verbal promifes, and fervants' wages.

As any contract, by which a determinate fum of money becomes due to any perfon, and is not paid, but remains in action merely, is a contract of debt, we have various kinds of debts; and they are ufually divided into debts of *record*, debts by *fpecial*, and debts by *fimple* contract.

A *debt of record* is a fum of money which appears to be due by the evidence of a court of record. Thus, when any fpecific fum is adjudged to be due from the defendant to the plaintiff, on an action or fuit at law, this is a contract of the higheft nature, being eftablifhed by the fentence of a court of judicature. Debts upon recognizance, are alfo a fum of money recognized or acknowledged to be due to the crown or a fubject, in the prefence of fome court or magiftrate, with a condition that fuch acknowledgment fhall be void upon the appearance of the party, his good behaviour, or the like: and thefe, together with ftatutes merchant and ftatutes ftaple, &c. if forfeited by non-performance of the condition, are alfo ranked among this firft and principal clafs of debts, *viz.* debts of record; fince the contract, on which they are founded, is witneffed by the higheft kind of evidence, *viz.* by matter of record.

Debts by fpecialty, or fpecial contract, are fuch by which a fum of money becomes, or is acknowledged to be due, by deed or inftrument under feal. Such as, by deed of cove-

nant, by deed of fale, by leafe referving rent, or by bond or obligation. Thefe are looked upon as the next clafs of debts after thofe of record, being confirmed by fpecial evidence under feal.

Debts by fimple contract, are fuch, where the contract, upon which the obligation arifes, is neither afcertained by the matter of record, nor yet by deed or fpecial inftrument, but by mere oral evidence, the moft fimple of any; or by notes unfealed, which are capable of a more eafy proof, and (therefore only) better than a verbal promife. There is one fpecies of debts upon fimple contract, which is diftinguifhed by the now well-known appellation of "paper-credit." Thefe are debts by *bills of exchange*, and *promiffory notes*, which fee refpectively.

Debt, *Information of.* See Information.

Debt, *Chirographary*, in the *Ancient French Law*, is that due by virtue of a note, or writing under one's hand, and not proved in judicature.

Debt, *Hypothecary*, is that due in virtue of fome contract or judgment.

Debt, *Prædiatory*, is that arifing from an alienation of lands, &c. the whole purchafe whereof has not been paid.

Debt, *Privileged*, is that which muft be fatisfied before all others; as the king's tax, &c.

DEBTEE Executor. If a perfon, debtor to another, makes his creditor or debtee his executor, or if fuch creditor obtains letters of adminiftration to his debtor, he may retain fufficient to pay himfelf before any other creditors whofe debts are of equal degree. Blackft. Com. vol. iii. p. 18. See Executor and Retainer.

DEBTOR, a perfon who owes fomething to another: in oppofition to creditor, which is he to whom it is owing. Concerning the treatment of infolvent debtors by the 12 tables, &c.; fee Bankrupt.

DEBTS, Priority of. See Executor.

Debts, *Public*, are debts entailed by a government upon the induftry and refources of pofterity, in order to provide for the prefent excefs of the expenditure above the ordinary revenue of a country. In the earlier periods of the different ftates of Europe, the annual expences both of the civil and military adminiftration appear to have been always raifed within the year. The former, indeed, were altogether inconfiderable, and the latter, whenever they occurred, in confequence of being thus directly paid by the people, were fpeedily checked by the difficulty of providing for them. But fince the fyftem of *borrowing* has been adopted, and government have been obliged to provide no more than the annual intereft of the money which they expended, wars have not only been multiplied and protracted, but rendered more expenfive by the facility with which the means of maintaining them have been fupplied; and hence debts and taxes have accumulated till they have involved moft of the nations which have had recourfe to them in diftrefs and ruin.

In Great Britain this fyftem of borrowing, though hitherto exempt from the confequences which it has produced in other countries, has been carried to a much greater extent, and its progrefs feems to have been accelerated in proportion as the debt has become more enormous; fo that, during the laft fifteen years, it has almoft *tripled* the accumulation of the preceding century, and the fum now annually raifed for the mere payment of the *intereft* would have nearly difcharged the whole *principal* of the debt, at a time when the nation was in fear of being overwhelmed by the weight of it.

The government of this country may, perhaps, have been neither more frugal nor more attentive to the interefts of the people *before*, than they have been *fince*, the revolution; yet it is certain, that at the death of Charles II., and even at the expulfion of his fucceffor, the nation was encumbered with no other debt than that of 664,263 to the bankers, which was charged upon the hereditary excife in the 12th of king William, and of 60,000*l.* to the fervants of Charles II., which was provided for in the firft feffion of parliament after the revolution. But, in confequence of the continued wars during the whole of king William's reign, above 61 millions were voted by parliament for the public expenditure; and on the 31ft of December, 1701, the nation was encumbered with a permanent debt of 6,748,780*l.* the annual intereft on which amounted to 566,165*l.* In the following reign, the fame fyftem of expending and borrowing was purfued without the leaft intermiffion. The grants of parliament, in the courfe of 13 years, exceeded 80 millions; and at the death of queen Anne in 1714, the debt amounted to 50,644,306*l.* requiring 2,811,903*l.* to be annually raifed in taxes on the property and labour of the people, towards paying the intereft of it.

On the acceffion of George I. the nation appears to have been fo ferioufly alarmed at the magnitude of the debt, and to have felt fo impatient under the burthens which it had impofed upon them, that they confidered the public expenditure as having nearly exhaufted the refources and deftroyed the credit of the country. The earlieft attention of government, therefore, was engaged in arranging the finances, and applying remedies to the evils which they threatened to the public peace and fecurity. Such of the taxes as were only temporary were made perpetual, and the funds which had hitherto been blended together, without order or diftinction, were divided into four claffes, and were appropriated to the following purpofes: 1ft. The Aggregate Fund, to the payment of intereft on money due to the bank of England, and on other debts, and alfo to the payment of 120,000*l.* *per ann.* for the ufe of the civil lift. 2dly. The South Sea Fund, to the payment of intereft on the capital of the South Sea company. 3dly. The General Fund, to the payment of intereft on 7,808,087*l.* ftock in the South Sea annuities—and 4thly. The Sinking Fund, which, confifting of the furplus of all the taxes, after difcharging the intereft, &c. in the three former claffes, was to be regularly applied to the payment of the national debt. During a few years after the eftablifhment of thefe funds, the application of them was attended to with confiderable care and vigilance; and the improvement of the finking fund, in particular, was recommended to parliament in fpeeches from the throne, with the fame zeal as it was echoed back in the addreffes of the houfe of commons. (See Funds.) But as the operations of this fund did not commence till the year 1719, and they were never affifted by any economy in the adminiftration of the finances, they produced but little effect during the remaining part of this reign; fo that, although the nation, through the whole courfe of it, was engaged in no wars of any confequence, the debt, inftead of being reduced, was increafed, on the 31ft of December, 1727, (or in fix months after the deceafe of George I.) to 52,092,235*l.*: but, in confequence of the reduction of *intereft* on fome part of this debt, the annual amount of the taxes neceffary to provide for the fame, was only 2,363,564*l.*, or 448,339*l.* lefs than at the clofe of the preceding reign.

When George II. fucceeded to the throne, the nation was in a ftate of peace, or, at leaft, was under the neceffity of providing for no other extraordinary expenditure than about 300,000*l.* a year in foreign fubfidies, towards preferving the balance of power, and fecuring the king's dominions in Germany. Neverthelefs, the minifter who had affumed fo much credit in eftablifhing the finking fund, and who had

had ſo often repreſented it as abſolutely neceſſary to ſave the nation from ruin, was the firſt to lay violent hands upon it, by appropriating a million of its produce to the ſupplies of the year;—a practice thus ſhamefully begun was continued without intermiſſion in the following years, and the alienation of this fund became as conſtant and invariable as the prodigal waſte and extravagance that produced it. Hence the nation, though diſturbed by no foreign wars during the firſt 13 years of that reign, and therefore expoſed to no extraordinary expenditure, derived little or no relief from a fund, which, if honeſtly applied in that time, and aſſiſted by public economy, would have diſcharged the greateſt part of its debts. At the end of the year 1739, therefore, when the clamours of the commercial part of the country forced the government into a war with Spain, the capital of the debt amounted to 46,382,650*l.*; and at the concluſion of that war, in 1749, which terminated with a general reſtitution of conqueſts, it had accumulated to 78,166,906*l.*, leaving the trade of the country encumbered with additional cuſtoms and exciſe, and the nation, in regard to its foreign poſſeſſions, exactly in the ſame ſtate as at the commencement of the war. From this period, to the beginning of the next war, the ſinking fund, inſtead of being aſſiſted in its operations by any economy in the management of the public finances, was invariably alienated towards providing for the ordinary ſupplies of the year, ſo that, during an interval of eight years' peace, only 3,089,641*l.* of the debt were redeemed, which did not amount to *one tenth* part of what had been incurred by the preceding war.

In the year 1756, the nation became again involved in hoſtilities, in conſequence (as M. Voltaire obſerves) of ſome diſputes about a few acres of ſnow in North America, and the public debt, which at the commencement of that war amounted to 75,071,264*l.*, had accumulated, at the death of the late king in 1761, to 110,604,836*l.*; and at the general peace in 1763, it amounted to 146,582,844*l.*, requiring 4,840,821*l.* to be annually raiſed in taxes towards paying the intereſt of it; a ſum conſidered at that time as too heavy to be borne by the people of Great Britain; and hence the miniſter directed his views to the colonies in North America, with the hope of making them bear a part at leaſt of the burdens which oppreſſed the mother country. As early therefore as the month of March 1764, it was reſolved in the houſe of commons, at the inſtigation of the miniſter, that it would be proper to impoſe certain ſtamp duties in the colonies for the purpoſe of raiſing a revenue in Great Britain; and in the year 1765 this reſolution was paſſed into a law. Thus, having juſt terminated a foreign war, the ſeeds were immediately ſown for kindling a civil one. It would be improper, in the preſent article, to trace the progreſs of the violence on one ſide, and of reſiſtance on the other, which mutually exaſperated the two countries; and it will be ſufficient only to obſerve here, that the flames of war burſt forth in the beginning of the year 1775. At that period, though the nation had enjoyed an external peace for more than twelve years, the debt was not reduced as many millions; for, at the commencement of the war, it amounted to 135,943,051*l.*, or only to 10,639,193*l.* leſs than its amount in 1763; ſo that in proportion as the public burthens increaſed, the efforts of miniſterial economy to relieve them appear to have become more feeble and inefficient. After having extended its ravages to both ſides of the globe, by drawing France, Spain, and Holland into an alliance with America, this war, begun for the oſtenſible purpoſe of leſſening the public burthens, by forcing the colonies to ſhare in them, terminated, like all other wars, without obtaining its object, and by increaſing thoſe burthens more than two-fold. The whole of the funded debt in January 1784 amounting to 232,152,803*l.*, and the unfunded debt to more than 36 millions, requiring an annual revenue of 9,569,907*l.* for the mere payment of intereſt upon it, excluſive of taxes, for the ordinary expences of the peace-eſtabliſhment, which had alſo increaſed nearly in the ſame proportion.

In this year commenced the adminiſtration of Mr Pitt, which is diſtinguiſhed for having added more to the public debts than all the adminiſtrations that have ever exiſted ſince the revolution. By the bad management of his predeceſſors, the unfunded debt had now accumulated beyond all example. The greater part of this enormous maſs was converted into a permanent debt in 3, 4, and 5 *per cents.* The former diviſion of the revenue into the *General*, the *South Sea* the *Aggregate*, and the *Sinking Fund*, was diſcontinued; the whole of the taxes were collected together into one fund, called the *Conſolidated Fund*, and one million of the ſurplus of thoſe taxes, after diſcharging the intereſt of the debt, &c. was to be appropriated annually towards redeeming the principal. During the firſt ſeven years, however, after this new arrangement of the finances, no ſuch ſurplus really exiſted (although the public were amuſed with the belief of it), and the deficiencies were made up by loans; by the receipt of balances in the hands of the collectors, and other adventitious means; ſo that at the end of nine years of peace, the nation, ſo far from being relieved of any of its burdens, found itſelf loaded with a permanent debt of 260,892,756*l.*, excluſive of what remained unfunded, amounting to many millions more. It muſt, however, be obſerved, that this interval of peace had been diſturbed at different times, by provocations to hoſtilities with Holland, Ruſſia, and Spain, and that the expenditure in conſequence had been increaſed by the warlike preparations of the miniſter. But certainly the additional expences incurred on theſe occaſions were not to ſuch an extent as to account for the inſufficiency of the public income, and to juſtify him in aſſerting that it was more than equal to the ordinary expenditure of a peace eſtabliſhment. It is, however, a matter of little moment at preſent on which ſide of the account the balance then lay. The debts have ſince ſwollen into ſuch a ſtupendous maſs as to render the ſurplus or the deficiency of a few millions in the revenue, an object neither of hope on the one hand, nor of apprehenſion on the other.

In the year 1793, the government, alarmed at the progreſs of the French revolution, plunged the nation into a war, the moſt calamitous and expenſive that ever deſolated the population, or deſtroyed the reſources of the country; from which it juſt emerged at the end of eight years, to ſink deeper than ever into a gulph which has ſwallowed up all the old governments on the continent of Europe, and which the warmeſt and ſtouteſt of our own cannot contemplate without anxiety. From the commencement of this war, to the ceſſation of hoſtilities in 1801, a term diſtinguiſhed above all others in the annals of this country, by the greateſt waſte of the public treaſure, and the moſt improvident extravagance in contracting the public loans, the debt had accumulated ſo far beyond all former example, that at the final cloſing of the accounts in April, 1803, it amounted, after deducting 67 millions which had been redeemed by the ſinking fund, to a capital of 531,769,159*l.* requiring 24,564,811*l.* to be annually raiſed in taxes towards paying the intereſt, excluſive of the ſums neceſſary for the intereſt upon the unfunded debt, and for the expences of the civil and military eſtabliſhments, amounting at leaſt to twelve millions more, and making the whole peace eſtabliſhment to exceed 36 millions *per annum*.

Encumbered with ſuch an immenſe weight of debts and

taxes, incurred for the moft part in the fupport of wars deftructive of the beft interefts of the country, it was to have been hoped that peace, fo highly neceffary to heal the wounds, and relieve the burdens under which it laboured, would have been fuffered to remain a few years at leaft undifturbed; but unfortunately this hope has been difappointed. The rejoicings on the termination of one war had hardly been finifhed, before the kingdom was plunged into all the miferies of another; which, having raged with unabated violence and expence for more than five years, without affording the moft diftant profpect of being concluded, renders it impoffible at this time to determine to what greater fum the debts may be accumulated. The following ftatements, therefore, deduced from the accounts which were laid before parliament in March, 1808, are confined to the end of the preceding year; but they exhibit a picture of itfelf fufficient to alarm the nation, without being reminded of the many additional millions, which have been borrowed and expended in the prefent year.

Amount of the Public Debt on the 1ft of February, 1808.

46,184*l.* annuities on lives granted prior to, and during the prefent reign, fuppofed to be worth about 7 years purchafe - -		£323,288
Sum fubfcribed in 1766 for annuities with benefit of furvivorfhip - - - -		18,000
Ditto fubfcribed in 1789 for ditto - -		1,002,099
1,047,494*l.* annuities expiring in 1860, valued at 5*l. per cent.* - - - - - -		19,292,700
Stock in the 3 *per cents.*	£590,091,288	
Redeemed by the commiffioners	125,177,702	
		464,913,586
Stock in the 4 *per cents.* -	49,425,085	
Redeemed by the commiffioners	2,617,400	
		46,807,685
Stock in the 5 *per cents.* -	44,830,742	
Redeemed by the commiffioners	142,000	44,688,742
Imperial Loans.		
Stock in the 3 *per cents.* -	7,502,633	
Redeemed by the commiffioners	829,426	
		6,673,207
230,000*l.* annuities for 13 years, valued at 5 *per cent.* - - - - - - -		2,160,505
Whole of the funded debt - -		£585,879,812

Unfunded Debt, not provided for on the 5th of January, 1808.

Exchequer bills -	£31,942,900	
Treafury warrants, &c. -	727,101	
Barracks and ordnance -	1,252,182	
Navy - - - - -	6,561,237	
Civil Lift advances - -	50,430	
		40,533,850
Whole of the funded and unfunded debt of Great Britain - - - - -		626,413,662
As Ireland now conftitutes a part of the united kingdom, its debts may not improperly be added to the preceding account, and are as follow:		
Stock in the 3 *per cents.* -	47,139,625	
Redeemed by the commiffioners	4,628,926	
Carry over	42,510,699	
Brought over	42,510,699	626,413,622
91,208*l.* annuities expiring in 1860, valued at 5 *per cent.*	1,679,870	
		44,190,569
Whole of the funded and unfunded debt of the united kingdom - - - -		£670,604,231

Amount of the Sums neceffary to be raifed in Taxes towards defraying the annual Charge of the National Debt.

Intereft on the unredeemed part of the debt -	£19,014,619	
Annual appropriation for the redemption of the debt - - -	9,338,814	
Annual charges of management - -	272,948	
		£28,626,382
Intereft on the unredeemed part of the imperial loans	432,792	
Annual appropriation for the redemption of the debt - - -	22,287	
Charges of management -	5,645	
		460,724
Intereft on exchequer bills - -		1,574,362
Whole amount of the fums to be annually raifed on account of the debts of Great Britain - - -		£30,661,468
Intereft on the unredeemed part of the Irifh debt -	£1,253,840	
Annual appropriation for the redemption of the debt - -	118,064	
Charges of management	19,163	
		1,391,067
Whole amount of the fums to be annually raifed on account of the debts of the united kingdom of Great Britain and Ireland - - - - -		£32,052,535

In addition to thefe fums, about 40 millions are neceffary to be raifed in each year towards providing for the civil and military eftablifhment, which, of courfe requiring new loans and taxes, are continually adding to the permanent burdens of the kingdom; nor is it eafy to determine to what further extent their weight may be increafed by the prefent war. They have already far exceeded what the moft fanguine had conceived it poffible for the nation to fupport; and the debt has long ago over-paffed the bounds which had been affigned to public credit. A continued progreffion, however, in the fame career of expence muft at laft terminate in that ruin which the more timid may perhaps have anticipated too foon, but which by being protracted, will only be rendered more general and deftructive. See on this fubject "The Hiftory of our Debts and Taxes." Dr Price's Tracts on the National Debt. Mr. Morgan's Tracts on the Public Finances &c. &c.

Debts *and Credits*, in *Military Language.* Every captain of a troop or company, in the Britifh fervice, is directed to give

give in a monthly ftatement of the "debts and credits" of his men; and it is the duty of every commanding officer to examine each lift, and to fee that no injuftice or irregularity has been countenanced or overlooked in fo important an object, as every money-matter between officer and foldier moft unqueftionably is.

DEÇA, in *Geography*, a river of Spain, which runs into the Xalon, two leagues below Anza in Aragon.

DECACHORDON, in *Antiquity*, a mufical inftrument, of ten ftrings, called by the Hebrews *hafur*, refembling our harp, of a triangular figure, with a hollow belly, and founding from the lower part.

DECACTIS, in *Natural Hiftory*, a name given by fome to a kind of ftar-fifh, of the branched, or aftrophyte kind, whofe rays are ten in number, where they firft part from the body, and each foon branches out into a number more.

DECADARCHUS, Δεκαδαρχος, among the Greeks, a commander of a party of ten men.

DECADE, a word ufed by fome old writers for the number ten; and decades, for an enumeration by tens: the word is formed from the Latin decas, which is derived from a Greek word of the fame import. The word has been more peculiarly appropriated to the number of books, *q. d.* decades into which the Roman Hiftory of Titus Livius is divided. Hence alfo came decadal arithmetic, the Decameron of Boccaccio, &c.

DECAGON, a plain figure in geometry, having ten fides and angles. If all the fides and angles be equal, it is called a regular decagon, and may be infcribed in a circle; for the method of doing which, fee PENTAGON. If A B, (*Geometry, Plate* VI. *fig.* 74.) be the fide of a regular decagon infcribed in a circle, whofe radius is A D, the radius will be a mean proportional between the fide of the decagon and the fum of that fide and the radius: *i. e.* A B : AD :: AD : AD + A B. Produce A B to F, fo that B F may be equal to A D, and draw D F and D B, then the angle A D B, being at the centre and fubtended by the fide of a decagon, is $= \frac{1}{10}$ of four right angles, or $\frac{1}{5}$ of two right angles, and therefore D A B + D B A = $\frac{4}{5}$ of two right angles, and A B D (= D A B) = $\frac{2}{5}$ of two right angles = (as the external angle) B D F + B F D = (the triangle B D F being ifofceles) 2 B D F; and therefore B D F or B F D = $\frac{1}{5}$ of two right angles = A D B. Confequently the triangles A D B and A D F are fimilar, F being = A D B, and A being common, and therefore A F or A B + B D (= A D) : A D : : A D : AB.

Hence it appears that if the radius be cut in extreme and mean proportion, the greater fegment is the fide of the decagon A B. For, by divifion, $\overline{AB + AD} - AD$, *i. e.* A B : A D :: AD − A B : A B, or A D : AB : : A B : AD − A B, fo that A D is fuppofed to be cut in extreme and mean proportion. See EXTREAM and *Mean Proportion.* It alfo appears that the radius is to the fide of the decagon as 2 to $\sqrt{5} - 1$. For the rectangle of the extremes being equal to the fquare of the mean, we have $AB^2 + AB \times AD = AD^2$, and adding $\frac{1}{4}AD^2$, $AB^2 + AB \times AD + \frac{1}{4}AD^2 = \frac{5}{4}AD^2$, and $AB + \frac{1}{2}AD = \frac{AD\sqrt{5}}{2}$, and $AB = \frac{AD}{2}\sqrt{5} - \frac{AD}{2}$, and $2\,AB = AD \times \sqrt{5} - 1$. Therefore A D : A B : : 2 : $\sqrt{5} - 1$. Or, by an algebraic procefs, and the folution of a quadratic equation, making A D = a, and A B = x, we have $x^2 + ax = a^2$, and completing the fquare, $x^2 + ax + \frac{1}{4}a^2 = a^2 + \frac{1}{4}a^2 = \frac{5a^2}{4}$; and, by extracting the fquare root, $x + \frac{1}{2}a = \sqrt{\frac{5a^2}{4}}$, and $x = \sqrt{\frac{5}{4}a^2} - \frac{1}{2}a$; and fuppofing radius 1, x, or the fide of a decagon infcribed in the circle, $= \sqrt{\frac{5}{4}} - \frac{1}{2} = \frac{\sqrt{5} - 1}{2}$, and $2x = \sqrt{5} - 1$., and $1 : x :: 2 : \sqrt{5} - 1$, as before; or the fide of the infcribed decagon $= \frac{\sqrt{5} - 1}{2} \times r$, r being radius.

If the fide of a regular decagon be 1, its area will be $\frac{5}{2}\sqrt{5 + 2\sqrt{5}} = 7.6942088$; therefore, as 1 is to 7.69942088 fo is the fquare of the fide of any regular decagon to the area of the fame; fo that if s be the fide of fuch a decagon, its area will be equal to $7.6942088\,s^2$. See REGULAR *Figure*, and POLYGON.

DECALITRON, among the *Ancients*, a piece of money ufed by the people of Ægina, Corinth, and Syracufe, in value equal to $16\frac{2}{3}$ oboli of Athens.

DECALOGUE, the Ten Commandments of God, engraven on two tables of ftone, and given to Mofes.

The word is Greek, compofed of δεκα, *ten*, and λογος, *word*, *q. d. ten words.* Accordingly the Jews call them דברים עשרה, *the ten words*, which appellation is very ancient.

The Samaritans, both in their text and verfion, add after the feventeenth chapter of the twentieth chapter of Exodus, and after the twenty-firft verfe of the fifth chapter of Deuteronomy, an eleventh commandment, to build an altar on mount Gerizim, &c. But it is apparently an interpolation, to authorize their having a temple and an altar on that mountain; and to difcredit, if poffible, the temple at Jerufalem, and the worfhip there performed. It muft be added, however, that though all, both Jews and Chriftians, agree in the number of Ten Commandments, there is fome difference as to the manner of dividing them.

The Talmudifts, and Poftellus, after them, in his treatife "De Phœnicum Literis," fay, that the Decalogue, or Ten Commandments, were engraven quite through the tables which God gave to Mofes; but that neverthelefs the middle of the ם *Mem* final, and of the ס *Samech*, remained miraculoufly fufpended without adhering to any thing. See the Differtation on the Samaritan Medals, printed at Paris in 1715. They add, that the Decalogue was written in letters of light, *i. e.* in luminous fhining letters.

The Decalogue was originally delivered in two tables; one of which contains our duty to God, expreffed in the four firft commandments; and the fecond, our duty to our neighbour, enforced in the fix laft. The church of Rome, for a very obvious reafon, hath omitted the fecond commandment in many of her books; and in order to preferve the number complete, divided the laft into two. It is omitted not only in the fhort catechifms and manuals of the Romifh church; but in the reformed office of the bleffed virgin, printed at Salamanca, A. D. 1588, publifhed by order of Pius V.; and alfo in the Englifh office at Antwerp, A. D. 1658. See Stillingfleet's Works, vol. vi. p. 572.

DECAMERIS, a term fignifying a tenth part; ufed by Mr. Sauveur, and fome other authors, to mark and meafure the intervals of founds.

The word is formed of δεκα, *ten*, and μερις, *part.*

In

In Mr. Sauveur's syftem, the decameris is the tenth part of the heptameris, which he makes the feventh part of the meris; and this is the forty-third part of the octave; fo that the decameris is $\frac{1}{301}$ of an octave. See Mem. Acad. Scienc. 1701. and 1707.

DECAMERON, from δεκα, *ten*, and ημερα, *day;* a work containing the actions or converfations of ten days. Boccacio's Decameron confifts of one hundred novels related in ten days.

DECAMPMENT, in a *Military Senfe*, relates to the removal of troops from a place where they were encamped, or quartered. When the intention has been previoufly known, little precaution is ufed to conceal the movement, and the orders are, for the moft part, iffued one, or more, days before the army commences its march. At the hour appointed for ftriking the tents the drums beat *the general*, which is the fignal univerfally known for a removal of quarters; fo much fo indeed, that whenever *the general* is beat through the camp, or town, the whole prepare for marching by ftriking the tents, loading the baggage, harneffing the cattle, limbering the cannon, and all the various operations attendant upon fuch a change of locality. When the notice has been long given, it is ufual to allow from half to a full hour, between beating the general, and beating *the affemblée;* under the fuppofition that all would be duly prepared, and that a very fhort interval of time would fuffice for thofe feveral matters which are inevitably delayed to the laft moment. But when the decampment is rather fudden, and it has not been practicable to call in various detachments, out-pofts, &c. the time between the *general* and the *affemblée* is ufually extended, perhaps to two or three hours, to allow the warning to be generally known, and that every thing may be completed for removal.

Decampments arifing from emergency, fuch as the intelligence of riots, &c. in neighbouring towns, or of an intended furprife by a party of the enemy, are commonly announced by beating *to arms*, on which fignal, every one repairs to his poft, and the means of attack, of refiftance, or of retreat, become the firft confideration. When this happens in confequence of an expected affault, and that it is found expedient to retire before a fuperior force, the baggage, &c. is fent forward, and the troops act as an efcort, or covering-party; where riots, &c. demand the prefence of the troops elfewhere, the baggage is either ordered to follow with all due circumfpection and activity, under a fmall guard; or it is left, as it is technically termed, "on the ground," (*i. e.* at the place quitted by the troops,) to await further orders.

Decampments made for fecret purpofes, fuch as a night attack upon an enemy, or for the purpofe of avoiding an attack, or for changing the pofition of a line unknown to the enemy, fo that he may be deceived, either by having to oppofe a greater force than was expected, or by finding that poft vacated, towards which he had beftowed a large portion of his force, thus thrown out of the line of action; are ufually made *without beat of drum.* And in order to carry on the intended deception, it is not uncommon to leave a few horfemen to keep up the ordinary fires; to challenge the approaching troops; or to appear, when the decampment is known to the enemy, as the rear, or baggage-guard, and thus to lead them into a purfuit; fo that they may either fall into an ambufcade, or be more completely detached from their main body, and eventually be cut off. In fact, we are not to confider decampment as the mere act of removal from one quarters, camp, or pofition, to another; but as one of thofe *rufes de guerre*, which often give a complete turn to the pofture of affairs, and have been known to change the campaign into a new direction, as well as to give it a new afpect. This device was one of the moft fuccefsful, among the many exercifed, againft our commanders, by the great Wafhington: perhaps it would he difficult to quote any inftances in European warfare, that could bear a competition for fkill, and allurement, with thofe practifed by that worthy and brave general. Nor have the French, during their late fucceffes among the fubdued ftates of Europe, been a little indebted to this deception; whether by bribery, by ignorance, or by want of prudence, our allies have on various occafions fuffered partly by this *ignis-fatuus* fyftem; and when they thought it was impoffible for the object of clandeftine attack to efcape, have found their rear fuddenly affaulted by the very troops they judged to be fome miles diftant in their front.

Hence our readers will perceive that decampment may be occafionally confidered rather as an evolution, than as a mechanical operation; and that, when well conducted, it often affords the means of avoiding intended mifchief, and of feverely retaliating on the enemy.

DECAMYRON, in the *Medicinal Writings of the Ancients*, the name of a malagma or cataplafm, confifting of ten different kinds of aromatics: thefe were the Indian leaf, maftic, euphorbium, fpikenard, adarce, ftorax, pepper, ointment of nard, opobalfamum, and wax.

DECANDRIA, in *Botany*, the tenth clafs of plants, with hermaphrodite flowers, and ten ftamina, or male parts in each.

The word is formed of the Greek δεκας, *ten*, and ανηρ, *male*.

Of this clafs of plants there are five orders; *viz.* the *monogynia*, containing fifty-three genera; the *digynia*, comprehending twelve genera; the *trigynia*, eleven; the *pentagynia*, fourteen; and the *decagynia*, two genera.

DECANTATION, is the act of pouring a liquor off clear from the dregs or fediment.

DECANUS, among the Romans, an officer who had ten other officers, or perfons, under his charge; whence our Englifh dean. See Dean.

Decanus, in *Aftrology*, a title given to the god who prefided at any birth, ὁ ωροσκοπος. See Astrology.

DECAPITE', in *Heraldry*. See Defait.

DECAPOLIS, in *Ancient Geography*, a country of Paleftine, which contained 10 principal cities, fome on this and fome on the other fide of Jordan, whence the name. Pliny enumerates the following: Scythopolis, Philadelphia, Raphanæ, Gadara, Hippos, Dion, Pella, Gerafa, Canatha, and Damafcus. Others reckon them differently. They were chiefly inhabited by the Gentiles, though fome of them might be within the region of Judæa.

DECAPROTI, Decemprimi, among the *Ancients*, were officers who gathered the tributes, or taxes.

The word comes from δεκα, *ten*, and πρωτος, *firft;* probably becaufe the ten firft, or principal perfons of each community, were chofen to make the levies.

The decaproti were obliged to pay for the dead; or, to anfwer to the emperor for the quota of fuch as died, out of their own eftates. Cicero, in his oration for Rofcius, calls them decemprimi.

DECASMUS, Δεκασμος, in *Antiquity*, the name of an action or procefs among the Athenians, which was brought againft any perfon who offered a bribe. They thought it not enough to punifh the perfon receiving a bribe, but that the perfon who offered it ought to be punifhed likewife. Pott. Archæol. Græc. lib. i. c. 23.

DECASPERMUM, in *Botany*. See Psidium.

DECASTADIUM, in *Ancient Geography*, a town of Italy in Brutium, at its fouthern extremity, S. of Rhegium, and on the fame coaft.

DECASTYLE, in *Architecture*. A temple is faid to be decaftyle,

decaſtyle, when its portico contains ten columns in a linei front: From δεκα, *ten*, and ϛυλος, *column*.

DECATARIA, in *Ancient Geography*, a town of Illyria in Dalmatia.

DECCAN, in *Geography*, a general term, ſignifying the *South*, but applied by the Indian geographers to the countries that lie ſouth of the parallel of 21° or 22° of N. lat. and compriſing nearly one half of the tract generally known by the name of the Mogul empire, ſo that the Deccan and peninſula are about equal to the Britiſh Iſlands, Spain, and Turkey in Europe. The Deccan, in its moſt extenſive ſignification, includes the whole peninſula ſouth of Hindooſtan proper; but in its limited ſenſe and ordinary acceptation, it denotes only the countries ſituated between Hindooſtan proper, the Carnatic and Oriſſa, that is, the provinces of Candeiſh, Amednagur, or Dowlatabad, Viſiapour, Golconda, or Biſnagur, and the weſtern part of Berar. Many attempts were made by the Mogul emperors, towards the cloſe of the 13th and commencement of the 14th century, for ſubduing the Deccan; but about the year 1344, when Mahomed III. was emperor, the princes of the Deccan aſſumed courage, and headed by Belaldeo, king of the Carnatic, drove the Mahomedans entirely out of thoſe countries; and nothing remained to them, except the fortreſs of Dowlatabad, or Deogur. About the beginning of the 16th century, the Portugueſe firſt accompliſhed the paſſage to India by the Cape of Good Hope, but their connexions were altogether with the maritime parts of the Deccan. As it had been long a ſtumbling-block to the Mogul emperors, Acbar, in 1585, reſolved on the attack of it, and ſoon after carried the war into Berar, while another army was reducing Caſhmere, in an oppoſite corner of the empire. However, at the time of Acbar's death, in 1605, no further progreſs was made in the reduction of the Deccan, and the adjoining countries, than the taking poſſeſſion of the weſtern part of Berar, Candeiſh, Tellingana (a diviſion of Golconda), and the northern part of Amednagur; the capital of which, bearing the ſame name, was taken in 1601, after a long and bloody ſiege, and an unſucceſsful attempt to relieve it, by the confederate princes of the Deccan. In the reign of Shah Jehan, who aſcended the throne in 1628, the conqueſt of the Deccan was vigorouſly purſued; and the plunders and devaſtations perpetrated there occaſioned moſt, or all of its princes to make ſubmiſſion, and acknowledge the emperor, lord paramount. Golconda was in part actually taken poſſeſſion of; but Viſiapour, and the Carnatic, together with the region of the Gauts, remained in the hands of their ancient poſſeſſors.

During the latter part of the reign of Aurungzebe, who diſdained to have any other boundary on the ſouth beſides the ocean, the conqueſt of the remote part of the Deccan employed a very conſiderable part of his leiſure; when the whole of that region, together with the peninſula, a few mountainous and inacceſſible tracts only excepted, were either entirely ſubjected, or rendered tributary to the throne of Delhi. What ſeemed to induce Aurungzebe to ſubdue the Deccan was the determined ſpirit and growing power of Sevajee, the founder of the Mahratta ſtate; who, by his conqueſts in Viſiapour, appeared almoſt under the character of a rival to Aurungzebe. Accordingly he was employed in the Deccan from the year 1678 to the time of his death, in 1707. Deccan was erected into a vice-royalty or ſoubah, and at the time of the invaſion of Nadir Shah, the viceroy was Nizam-al Muluck, who preſerved an apparent independence, and whoſe juriſdiction extended from Burhampour to Cape Comorin, and eaſtward to the ſea. Six provinces depended on this prince, and the number of his ſubjects was eſtimated at 35 millions. The Mahrattas, however, are in poſſeſſion of the greater part; other diſtricts have from time to time been formed into ſeparate ſtates; and the conſtant revolutions in India, render the boundaries of each country uncertain. The poſſeſſions of the Nizam, or ſoubah of the Deccan, (a younger ſon of the famous Nizam-al-Muluck) comprize, as they are ſtated in major Rennell's Memoir, the province of Golconda, that is, the ancient province of Tellingana, or Tilling, ſituated between the lower parts of the courſes of the Kiſtnah and Godavery rivers, and the principal part of Dowlatabad; together with the weſtern part of Berar, ſubject to a tribute of a chout, or fourth part of its net revenue, to the Berar Mahratta. The Nizam has the Paiſhwah, or Poonah Mahratta, on the weſt and north-weſt, the Berar Mahratta on the north, the northern Circars on the eaſt, and the Carnatic, and the late Hyder Ally on the ſouth. His weſtern boundaries, during his wars with the Mahrattas, have been ſubject to continual fluctuation; but they are underſtood generally to extend more than 40 miles beyond the city of Aurungabad, weſtwards; and to come within 80 miles of the city of Poonah; and on the S.W. to go conſiderably beyond the river Beemah, and to the borders of Sanore-Bancapour. His capital is Hydrabad or Bagnagur, ſituated on the Mouſſi river, near the famous fortreſs of Golconda. The diſtricts of Adoni and Rachore, which were in the hands of Bazalet Jung, (brother to the Nizam,) during his life-time, are now in the hands of the Nizam. The ſourapour, or ſollapour-rajah, on the weſt of the Beemah river, together with ſome other rajahs, are his tributaries. Probably, ſays Mr. Rennell, (Memoir, Introd. p. 136.) the Nizam's dominions, including his tributaries and feudatories, are no leſs than 430 miles in length, from N. W. to S. E., by 300 wide. Till he took poſſeſſion of the Guntoor Circar in 1780, his dominions no where touched on the ſea-coaſt; but Guntoor has been ſince ceded to the India company. See CIRCAR.

DECCAN *Shabazpour*, an iſland of India, in the mouth of the Ganges. N. lat. 22° 30′. E. long. 98° 58′.

DECEATES, in *Ancient Geography*, the name of a people who occupied the eaſtern ſide of Gallia Narbonnenſis, near the Mediterranean ſea, according to Strabo and Pliny.

DECEATUM, the town of the Deceates, in Gaul, which belonged to the Liguri.

DECEBALUS, in *Biography*, one of the barbarian kings, who contended with the greateſt ſucceſs againſt the power of the Roman empire. He was raiſed to the throne of Dacia on account of his military talents, about the period in which Domitian was ſovereign of Rome. In the war that commenced about the year 86, he frequently defeated the Romans, with great ſlaughter; and in one inſtance, prevented, by ſtratagem, the enemy from advancing to his own capital, by felling a great number of trees, and covering their trunks with armour, ſo as to appear like ſoldiers. Shortly after Domitian ſought for peace, to which Decebalus acceded, upon condition that he ſhould receive from the emperor's own hand a diadem, and a yearly tribute under the form and title of a penſion, which was regularly paid till the time of Trajan, who not only refuſed to be tributary to the Dacians, but entered his country with a powerful army, and was completely victorious. Decebalus was obliged to ſubmit to very humiliating terms; for the ſake of peace, he agreed to give up his arms and diſmantle his fortreſſes. Scarcely, however, had the emperor departed before the Dacian king prepared for new hoſtilities, and defied the power of Rome: Trajan was again ſucceſsful, and Decebalus, who found himſelf unequal to the open conteſt, determined to deſtroy by treachery and

and aſſaſſination him whom he durſt not meet in the field. For this purpoſe he perfidiouſly got poſſeſſion of Longinus, the favourite officer of the Roman emperor, and endeavoured, by bribes and by threats, to make uſe of him as the inſtrument of his maſter's death. Longinus preferred the life of his king to his own, and by poiſon freed himſelf from the power of his enemy. Trajan now built his celebrated bridge over the Danube, completely conquered Dacia, and took poſſeſſion of its capital. Decebalus, ſeeing no chance of eſcaping from the hands of the emperor, put an end to his own life; and with him terminated the independence of Dacia, which was aftewards a mere Roman province. He had concealed the vaſt treaſures which he had accumulated, but theſe were diſcovered to the conqueror, and were found more than equal to the expence of the war. In the early part of life Decebalus had the character of being equally wiſe in council, and prompt in action; ſkilful in all the manœuvres of war, poſſeſſed of vigour to improve a victory, and conſtancy to repair a defeat. Univ. Hiſt.

DECEIT, *Deceptio*, or *Dolus*, in *Law*, is uſed for any ſubtile, wily ſhift, or trick; to which may be referred all manner of craft, ſubtility, guile, fraud, ſleight, cunning, covin, colluſion, and practice uſed to deceive another by any means.

Deceit is an offence both by common law and by ſtatute. All practices of defrauding, or endeavouring to defraud, another of his right, are puniſhable by fine and impriſonment, ſometimes pillory, &c. (ſee CHEATS); and there is a writ called deceptione that lies for one who receives injury, or damage, &c.

Serjeants, counſellors, attornies, and others, chargeable with deceit are to be impriſoned a year and a day; alſo pleaders by deceit ſhall be expelled the court: ſtat. 3. Ed. I. c. 29.

An action of deceit will give damages in ſome particular caſes of fraud; and principally where one man does any thing in the name of another, by which he is deceived or injured; as if one brings an action in another's name, and then ſuffers a non-ſuit, whereby the plaintiff becomes liable to coſts; or where one obtains or ſuffers a fraudulent recovery of lands, tenements, or chattels, to the prejudice of him that hath right. As when by colluſion the attorney of the tenant makes default in a real action; or where the ſheriff returns that the tenant was ſummoned when he was not ſo, and in caſe he loſes the land, the writ of deceit lies againſt the demandant and alſo the attorney, or the ſheriff and his officers, to annul the former proceedings, and recover back the land. It alſo lies in caſes of warranty, and other perſonal injuries committed contrary to good faith and honeſty. But an action on the caſe, for damages, in nature of a writ of deceit, is more uſually brought on theſe occaſions. And indeed it is the only remedy for a lord of a manor, in or out of ancient demeſne, to reverſe a fine or recovery had in the king's courts of lands lying within his juriſdiction, which would otherwiſe be thereby turned into frank fee. And this may be brought by the lord againſt the parties, and *ceſtuy que uſe* of ſuch fine or recovery; and thereby he ſhall obtain judgment not only for damages (which are uſually remitted), but alſo to recover his court and juriſdiction over the lands, and to annul the former proceedings.

A writ of deceit lies not only againſt attornies, for loſſes ſuſtained by their default; but alſo againſt bakers, brewers, and other artificers, for not ſelling good commodities, or refuſing, to perform a bargain: in all which caſes they are by ſtatute liable to penalties in proportion to their offence.

DECEIVED, in the *Manege*, is uſed when a horſe upon a demi-volt of one or two treads, working, for inſtance, to the right, and not having yet finiſhed above half the demi-volt, is preſſed one time or motion forwards with the inner leg, and then is put to a repriſe upon the left, in the ſame cadence with which he began. He thus regains the place where the demi-volt had been begun to the right, and works to the left. A horſe may in this manner be deceived on any hand. Guillet, Gen. Dict. p. i. in voc.

DECELEA, or DECELIA, in *Ancient Geography*, a town of Greece, in Attica. It was taken and fortified by the Lacedæmonians in the 19th year of the Peloponneſian war. It lay N. E. of Athens, near the ſource of the Cephiſus.

DECEMBER, in *Chronology*, the laſt month of the year; wherein the ſun enters the tropic of Capricorn, and makes the winter ſolſtice.

In Romulus's year, December was the tenth month; whence the name, *viz.* from *decem*, ten: for the Romans began their year in March.

The month of December was under the protection of Veſta: Romulus aſſigned it thirty days; Numa reduced it to twenty-nine; which Julius Cæſar increaſed to thirty-one.

Under the reign of Commodus, this month was called, by way of flattery, Amazonius, in honour of a courteſan, whom that prince paſſionately loved, and had got painted like an Amazon; but it only kept the name during that emperor's life.

At the latter end of this month they had the Juveniles ludi, and the country people kept the feaſt of the goddeſs Vacuna in the fields, having then gathered in their fruits, and ſown their corn; whence ſeems to be derived our popular feſtival called harveſt-home.

DECEMBRIO, PIETRO CANDIDO, in *Biography*, a learned Italian, was born at Pavia, in 1399, and was at an early age appointed ſecretary to Philip-Maria Viſconti, duke of Milan, in whoſe ſervice he continued till the death of his noble maſter in 1447. He is celebrated in hiſtory as one of the moſt able and ſtrenuous defenders of the liberties of the Milaneſe. When they ignobly reſolved to ſubmit to the arms of Francis Sforza, he refuſed to accept the humiliating office of ſurrendering the city to the conqueror. When the cauſe of Milan was hopeleſs, he became apoſtolic ſecretary to pope Nicholas V., and removed to Rome. He was likewiſe at ſome period of his life, the date of which has not been exactly aſcertained, ſecretary to Alphonſo of Arragon, king of Naples. Notwithſtanding the buſineſs which theſe important offices devolved upon him, he found leiſure to do much in the cauſe of literature. He wrote the lives of Philip Maria Viſconti, and Francis Sforza, dukes of Milan, in the manner of Suetonius. He tranſlated "Appian's Hiſtory;" "Quintus Curtius," and the firſt ten books of Livy's Hiſtory. This was by the command of king Alphonſo. He tranſlated into Latin proſe, the hiſtory of Diodorus Siculus, and various other works of the ancients, and was author of many miſcellaneous pieces in proſe and verſe, in the Latin and Italian languages. He died at Milan in the year 1477, and was buried in the cathedral of St. Ambroſe. Gen. Biog.

DECEM-PAGI, in *Ancient Geography*, *Dieaze*, a place of Gaul, in Belgica Prima, belonging to the Mediomatrici, N. W. of Pons Saravi.

DECEMPEDA, Δεκαπους, *ten-feet rod*; an inſtrument uſed by the ancients in meaſuring.

The decempeda was a rule or rod, divided into ten feet; whence its name, from *decem*, *ten*, and *pes*, *pedis*, *foot*.

The foot was ſubdivided into twelve inches; and each inch into ten digits.

The

The decempeda was used both in measuring of land, like the chain among us; and by architects, to give the proper dimensions and proportions to the parts of their buildings, which use it still retains. Horace, lib. ii. od. 15. blaming the magnificence and delicacy of the building of his time, observes, that it was otherwise in the times of Romulus and Cato; that in the houses of private persons there were not then known any porticoes measured out with the decempeda, nor turned to the north to take the cool air.

DECEMSEPTIMA, in *Ancient Geography*, a town of Spain, belonging to the Cosetani, N. E. of Tarraco.

DECEM-TALES, in *Law*, a writ that issues directed to the sheriff, whereby he is commanded to make a supply of jurymen, when a sufficient number does not appear on a trial at bar.

DECEMVIRI, an order of annual magistrates among the Romans, created with a sovereign power to draw up and make laws for the people; thus called, because their number was ten.

To the decemviri was given all the legislative authority ever enjoyed by the kings, and after them by the consuls. One among them had all the ensigns and honours of the function; and the rest had the like in their turn, during the year of their decemvirate.

The decemviri were those who drew up the laws of the Twelve Tables, called thence leges decemvirales, which for a considerable time were the whole of the Roman law. See TABLES.

In the year 302, the consuls Appius Claudius Crassinius, and T. Genucius Augurinus, being obliged to abdicate, the first decemviri were created; in the year following, ten new ones were appointed to succeed them; they at first behaved with great moderation, and administered justice to the people each every tenth day; the twelve fasces were carried before him who was to preside, and his nine colleagues were attended by a single officer, called *Accensus;* they proposed ten tables of laws, which were ratified by the people at the "Comitia curiata," in the composition of which they are said to have had the assistance of one Hermodorus, an Ephesian exile, who served them as an interpreter; and as two other tables seemed to be wanting, decemviri were again created for another year to make them; and in the year 304, another set was to have been chosen, but that the people rose, made them lay down, and resumed the consuls. The excessive debauchery of Appius Claudius Crassinius, one of the consuls, who was first obliged to abdicate, and who had been chosen first decemvir three times, was the principal cause of all this. Cicero De Finib. lib. i. Livy, lib. iii. Halicarnasseus, lib. x. and Florus, lib. i. c. 24. relate the history.

The decemviral administration, however, it is to be observed, had not its first rise at the time when the authority of the consuls was devolved into the hands of the decemviri: for, during the interregnum that ensued after the death of Romulus, the management of affairs, which the senate then took upon them, is called by Halicarnasseus, lib. ii. decemviral, because the senators, divided into tens, commanded each in their turn: that is, one of each ten, for five days successively, having the fasces, lictors, &c. like the kings.

There were also military decemviri; and on divers emergencies, decemviri were created to manage and regulate certain affairs, after the same manner as boards of commissioners are appointed among us. Thus we find decemviri for conducting colonies; decemviri, who officiated as judges in cases of litigation, under the quæstor and prætor; decemviri for dividing the lands among the veteran soldiers; decemviri to prepare and preside at feasts in honour of the gods; decemviri to take care of the sacrifices; and decemviri to keep the Sibyls books.

Sometimes, in lieu of decemviri, they only created septemviri or triumviri, or duumviri, &c.

DECENNALIA, in *Antiquity*, feasts which the Roman emperors held every tenth year of their reign, with sacrifices, games, largesses, to the people, &c.

Augustus was the author of this custom, which was afterwards imitated by his successors.

At the same time they likewise offered vows for the emperor, and the perpetuity of his empire, called vota decennalia.

From the time of Antoninus Pius, we find these ceremonies marked on medals, PRIMI DECENNALES, SECUNDI DECENNALES. VOTA SOL. DECEN. II. VOTA SVSCEP. DECENN. III.

These vows must have been made at the beginning of every tenth year; for on a medal of Pertinax, who scarcely reigned four months, we find VOTA DECENN. and VOTIS DECENNALIBUS.

Struvius is of opinion, that these vows took place of those which the censor used to make in the times of the republic, for the prosperity and preservation thereof. In effect, they were not only made in behalf of the prince, but also of the state, as may be observed from Dion. lib. viii. and Pliny the younger, lib. x. ep. 101.

Augustus's aim in establishing the decennalia, was to preserve the empire, and the sovereign power without offence or restraint to the people. For, during the celebration of this feast, that prince used to surrender up all his authority into the hands of the people, who, filled with joy, and charmed with the goodness of Augustus, immediately delivered it to him back again.

DECENNARY, *Decennaria*, the limits or compass of ten friburghs, or, a town or tithing consisting originally of ten families of freeholders. Ten tithings composed an hundred. The institution of decennaries (or frank-pledges) is ascribed to Alfred. In these decennaries the whole vicinity or tithing of franks were mutually pledges for the good behaviour of each other. See DECINERS, and TITHING.

DECENNOVIUM, in *Ancient Geography*, a canal of 19 miles from Forum Appii to Terracina, on which Horace embarked in the night. The Decennovium mentioned by Lucan, Dion Cassius, and Cassiodorius, has been successively ruined, restored, and obliterated. This canal, strangely confounded by Cluverius with the river Ufens, has recently served to drain the Pomptine marshes, by which they are converted into excellent pastures.

DECEPTION BAY, in *Geography*, a bay on the west coast of North America, in the North Pacific ocean. N. lat. 46° 10′. W. long. 124° 5′.

DECEPTION, *Cape*, a cape in Solomon's isles. S. lat. 8° 32′ 30″. E. long. 157° 2′ 14″.

DECEPTIONE, in *Law*, a writ which properly lies for one that receives harm or damage, by him that does any thing deceitfully in the name of another.

This writ is either original or judicial. Old Nat. Br. fol. 50. Fitz. Nat. Br. fol. 95. See Bag. of Writs, fol. 112. and Reg. Judicial. See DECEIT.

DECETIA, in *Ancient Geography*, *Decize*, a town of Gaul, in Lyonnensis prima. It belonged to the Ædui, and was situated on the Liger, S.E. of Noviodurum. See DECISE.

DECHALES, CLAUD FRANCIS MILLIET, in *Biography*, an excellent mathematician was born at Chamberry, the capital of Savoy, in 1611. He read lectures in the col-

lege of Clermont, at Paris, for about four years, where he was highly refpected for his fcientific talents, and greatly beloved on account of the probity of his heart, and the excellence of his difpofition. From Paris he removed to Marfeilles, where he taught the art of navigation and the practical mathematical fciences. He afterwards became profeffor of mathematics in the univerfity of Turin. Here he died in the year 1678, at the age of 67. His edition of Euclid is well known in this country; in this he has omitted many propofitions which he deemed of inferior importance, and he has explained the ufes of fome of thofe which he has retained. He is known alfo for treatifes on fortification, and navigation; and other works on the practical fciences. His works have been collected and publifhed, as a complete courfe of mathematics, in four volumes, folio. He is chiefly efteemed for the eafy method which he had adopted of explaining and illuftrating difficult fubjects.

DECHLANA, in *Geography*, a town of Afia in Albania.

DECIALES, a people of the maritime Alps, along the coafts, W. of the Veiauni.

DECIDUA Tunica, in *Anatomy*, the external membrane of the ovum, including the embryo, with the placenta and the other membranes. For the difcovery of this part we are indebted to Dr. William Hunter. He proved that it is produced by the veffels of the uterus itfelf, after impregnation, and before the arrival of the ovum in the cavity of that organ: he explained how it formed the medium of communication between the mother and the new being, by adhering on one furface to the uterus, and receiving continuations of the uterine blood veffels; and on the other, by being applied over the furface of the ovum, and forming in one part the uterine portion of the placenta, which is intimately blended with the ramifications of the umbilical veffels; he fhewed that it is thrown off from the uterus after the birth of the child, with the fecundines, and from that circumftance gave it the name of decidua. He was alfo of opinion that it confifted of two portions, one lining the cavity of the uterus *(decidua uteri)*, and another reflected over the ovum *(decidua reflexa)*. For a more particular account of this membrane, fee Generation, *Organs of*.

DECIDUOUS, in the general, expreffes a thing apt and ready to fall.

Deciduous *Leaves*, in *Vegetable Phyfiology*, are fuch as fall off in autumn, or at the approach of winter, as in moft trees and fhrubs of cold climates, and fome tropical ones; an entirely frefh crop being produced in the enfuing fpring. In North America the feafon in which this takes place derives its name from that circumftance, and inftead of autumn is univerfally called the *fall*. We are not, however, to fuppofe that the leaves of evergreen trees or fhrubs are not as regularly changed as deciduous ones; the only difference is, that they laft longer, thofe of fome trees being of biennial, others of triennial, or perhaps further duration, fo that the branches are never ftripped. The leaves of fuch evergreens generally fall in fummer, as foon as the young crop is fully grown, which may be obferved in the fir tribe.

How the falling or feparation of leaves from their branches is accomplifhed, has long been greatly mifunderftood. It is not always in confequence of the injuries of autumnal froft, for fome trees have their appropriate period of defoliation, feemingly independent of external caufes. The lime, *Tilia europæa*, commonly lofes its leaves before any froft happens: the afh, *Fraxinus excelfior*, feems, on the contrary, to wait for that event; and at whatever period the firft rather fharp froft takes place, all its leaves fall at once. The fall of the leaf can be confidered only as "a floughing or cafting off difeafed or worn-out parts," whether the injury to their conftitution may arife from external caufes, or from an exhauftion of their vital powers. Hence a feparation takes place, either in the footftalk, or, more ufually, at its bafe, and the dying part quits the vigorous one, which is promoted by the weight of the leaf itfelf, or by the action of autumnal winds upon its expanded form. Sometimes, as in the hornbeam, the beech, and fome oaks, the fwelling of the buds for the enfuing feafon is neceffary to accomplifh the total feparation of the old ftalks from their infertions. Sometimes trees or fhrubs, naturally deciduous, retain their leaves through a milder winter than ordinary, and even accidental varieties, raifed from feed, are occafionally more difpofed to be evergreen than is natural to their fpecies, witnefs the Privet, *Liguftrum vulgare*. Du Hamel very juftly obferves that trees killed by any fudden caufe, as thunder, retain their leaves firmly upon the branches. The reafon evidently is, that the vital principle, being perfectly extinguifhed cannot act to throw off the injured foliage. It is curious that Du Hamel, evidently very anxious, and greatly embarraffed, to underftand the fall of the leaf, fhould not have hit upon this fimple and evident explanation. S.

Deciduous *Plants*, in *Gardening*, are all fuch plants, whether of the tree or fhrub kind, as fhed or lofe their leaves, in the autumnal and winter feafons.

It is a term which embraces a great variety of both the former and latter forts, in moft of which the leaves begin to fall off in the autumn, and the whole are naked during the winter feafon. Almoft all the valuable timber and fruit trees are of this tribe, as well as the greateft part of the ornamental trees and fhrubs that are introduced in plantations and fhrubberies. There are likewife feveral other plants that may be termed deciduous, from their fhedding their leaves on the approach of winter. See Fruit and Forest *Trees*.

Trees and fhrubs of this fort are in general of hardy growth, being capable of fucceeding well in the full ground in different fituations according to their kinds. Particular defcriptions of the different forts, as well as of their habits of growth, culture, management, and ufes, are given under the genus to which they refpectively belong.

The proper feafons for removing this kind of plants from the nurfery or other places, and planting them out where they are to remain, are either the early fpring or autumn, according to the kind and the nature of the foil. In general, where the land is dry, the latter is the moft proper and advantageous; but in the contrary circumftances, the former may be the more adviſeable. In the planting out all trees, fhrubs, and other plants of this fort, fufficiently large openings fhould be formed for the roots to be conveniently bedded in, after having been fuitably trimmed according to the kinds; and the mould be made fine and well mixed in with the roots, by flightly fhaking the plants, and the foil then well trodden in about them. In the early plantings at both feafons it is of much advantage, efpecially when the weather is dry, to have them well watered occafionally, and moft of the forts fhould be kept fteady in their fituations by proper ftakes, as they never fucceed well where this is not the cafe, from their roots being deftroyed by being fo much agitated by the winds.

DECIES tantum, a writ that lies on ftat. 38. Ed. III. c. 12. againft a juror, who hath taken money of either party for giving his verdict. It is fo called from its effect, which is to recover ten times as much as he took.

It alfo lies againft embraceors that procure fuch an inqueft. See Embraceor.

DECIMA, or Dezima, in *Geography*, a fmall ifland in the harbour of Nagafaki, on the coaft of Japan, fituated in N. lat. 42°, and ceded to the Dutch.

Decima,

Decima, *Ital.*, the interval of a *tenth*, in *Music*, or octave of the 3d major or minor. Decima, preceding or following an integer, has in Italian the force of ten in English: as undecima, 11; duodecima, 12; decima terzo, 13; decima quarta, 14; decima quinta, the 15th or double octave; decima sesta, the 2d tripled, or octave of the 9th; decima settima, or 17th, &c.

DECIMÆ, or Decumæ, *Tenths*, or *Tithes*, in *Roman Antiquity*, a tribute or impost, which formed one part of the vectigalia of the Romans, in the early times of the commonwealth, and was raised upon lands. When the Romans had conquered a people, either in or out of Italy, they deprived them of part of their territory, of which they distributed a portion among citizens, who settled there as a colony, reserving the property of the rest to the state, which they farmed to particular persons, upon condition of paying a tenth of the profits of such lands to the Roman people. The tenths were not raised in the same manner in all the provinces. From some a certain quantity of grain, or a fixed sum of money, was exacted, as in Spain and Africa; and this impost was called "vectigal certum," because it was always the same, whether the year were good or bad, or the lands produced much or little. Other provinces, as Asia, were treated more favourably, and paid only the tenth precisely, so that the Roman people shared in the misfortune of barren years. Sicily was treated in the same manner, and, indeed, with still greater indulgence. Corn was bought from Sicily, and also from the other provinces, under three different denominations: *viz.* "frumentum decumanum," which was the 10th of the corn produced by each husbandman's lands, with which he was obliged to supply the Roman people *gratis*; "emptum," which was the corn bought by the Roman people for the occasions of the state, and on which they themselves fixed the price; and "æstimatum," which was the corn consumed in the prætor's house, and with which the province was obliged to supply him: this he sometimes received in money, and he fixed the value of it himself. The tenths of wine, oil, and the lower species of grain were also paid.

Those who farmed the tithes, "decumani," were esteemed the most honourable of the publicans or farmers general, as agriculture was esteemed the most honourable way of making a fortune among the Romans. The ground from which tithes were paid, was also called "decumanus." (See Cicero in Verr.) But these lands were all sold or distributed among the citizens at different times, and the land of Capua, the last by Cæsar. (Suet. Jul. 20. Cicero Att. ii. 16.

Decimæ. See Tithes.

DECIMAL, in a general sense, denotes any thing that proceeds by tens, as decimal arithmetic, fractions, scales, &c.

Decimal *Arithmetic*, the art of computing by decimal fractions, first invented by Johannes Regiomontanus, about the year 1464, and used by him in the construction of his tables of sines; who thus introduced decimal parts in the room of sexagesimals. They were also used by Ramus, in his Arithmetic, written in 1550; and before his time, by our countryman Buckley, and about the same time by Recorde. But the first person who wrote an express treatise on decimals, was Stevinus, about the year 1582.

This kind of arithmetic, in a general sense, may be considered as the common arithmetical computation in use, in which the decimal series of numbers is adopted, or in which the places of the figures change their value in a tenfold proportion, being 10 times as much for every place more towards the left hand, or 10 times less for every place more towards the right hand; the place being supposed to be indefinitely continued, both to the right and left. In this sense, therefore, the term comprehends both the arithmetic of integers, and decimal fractions. In a more limited sense, however, it is restricted to the latter.

Decimal *fractions*, are those whose denominator is 1, with one or more cyphers; as, 10, 100, 1000, 10000, &c. Thus, $\frac{5}{10}$, $\frac{6}{100}$, $\frac{7}{1000}$, &c. are *decimal fractions*.

In the writing of decimal fractions, we usually omit the denominator, as only consisting of unity with cyphers annexed; and in lieu thereof, a point, or comma, called the separatrix, is prefixed to the numerator. Thus, $\frac{5}{10}$ is written .5; $\frac{46}{100}$, .46. So .125 expresses a hundred and twenty-five parts of any thing supposed to be divided into a thousand parts.

This separatrix has been different according to the fancy of different authors; sometimes it has been a semiparenthesis or semicrotchet, or a perpendicular bar, or the same with a line drawn under the figures, or simply this line itself, &c. The point or comma, now generally used, has sometimes been placed near the upper part of the figures, which was done by sir Isaac Newton; and though it has been more commonly placed at the bottom, the other mode has the advantage of preventing the separatrix from being confounded with other characters of separation, particularly in large numbers, and also with mere marks of punctuation.

As cyphers on the right hand of integers increase their value decimally; as 2, 20, 200, &c. so, when set on the left hand of decimal fractions, they diminish the value decimally; as, 5, 05, 005, &c. when set on the left hand of integers, or on the right hand of decimals, they signify nothing, but only to fill up places; thus .5000 denotes only five tenths, and 0005. is only five units.

In setting down a decimal fraction without its denominator, the numerator must consist of as many places as there are cyphers in the denominator; and if it has not so many figures, the deficiency must be supplied by setting before them as many cyphers as will make them so many; thus $\frac{3}{10}$ is .3, $\frac{14}{100}$ is .14, and $\frac{14}{1000}$ is .014, and $\frac{3}{1000}$ is .003, &c.

To reduce any vulgar fraction, as suppose $\frac{5}{8}$, *to a decimal fraction* of the same value: add cyphers at pleasure to the numerator, and divide by the denominator; as thus,

$$8)5000($$
$$.625$$

And therefore $\frac{625}{1000}$, or .625, is a decimal of the same value with the former fraction $\frac{5}{8}$.

Some vulgar fractions can never be reduced into decimals without defect; as $\frac{1}{3}$, &c. in those cases, the greater number of places the decimals are continued to, the more is the defect diminished, in a tenfold proportion. Thus, $\frac{1}{3}$ expressed in decimals is .333333 *ad infinitum*.

Such decimals are very properly called circulating decimals, because of the continual return of the same figures; and they may be called indeterminate or infinite decimals, by way of distinction from those where the reduction leaves no remainder, and which are therefore called finite or determinate decimals. See Repetends.

By the rule above given, the parts of any integer may be easily reduced into decimals. Thus, 5 *s.* is $\frac{5}{20}$, or .25 of a pound sterling; 6 *d.* is $\frac{6}{240}$, or $\frac{1}{40}$, *i. e.* .025 of a pound; and 5 *s.* 6 *d.* is .25+.025=.275 *l.* Or the decimal of a mixed number may be readily obtained by reducing the number of the lowest species to the decimal of the next above; add to this the number of that species, if there be any

any, and reduce the ſum to the next higher ſpecies, adding to the number found the number of that ſpecies given in the queſtion; and thus proceed till you arrive at the propoſed integer; 4 *s.* 7 *d.* 3 *f.* are equal to .2322916 *l.* for 3 *f.* is $\frac{3}{4}$, or .75 *d.* to which add 7 *d.* and 7.75 is equal to $\frac{7.75}{12}$, or .645833, &c. *s.* to which add 4 *s.* and 4.645833, &c. is equal to $\frac{4.645833}{20}$, or .23229166 &c. *l.*

Or thus: write the numbers of different names or ſpecies in an orderly manner under one another, the leaſt being the uppermoſt, and on their left ſide draw a line: and let theſe be reckoned as dividends: Then, againſt each name on the left hand of the line, write the number, making one of its next superior name; and let theſe be the diviſors to the former dividends: Begin with the upper one, and write the quotient of each diviſion as fractions, on the right of the dividend next below it; and let this mixed number be divided by its diviſor; and the laſt quotient will be the decimal ſought. Thus, for the laſt example, 4 *s.* 7 *d.* 3 *f.*

4	3
12	7.75
20	4.645833, &c.
	23229166, &c. *l.*, the number required.

The ſame proceſs may be eaſily applied to the decimal parts of any other integer, as weights, meaſures, and time.

E. G. 1. Reduce 8 *oz.* 15 *dwt.* 18 *gr.* to the fractional part of a pound troy.

24	{ 4	18
	{ 6	4.5
20		15.75
12		8.7875
		0.732291 *lb.*, the anſwer required.

Note.—As 24 is too great a number to divide by in one line, it is broken into the parts 4 and 6, which multiplied together, make 24.

E. G. 2. Reduce 48′ 17″ 53‴ to the proportional part of a degree.

60	53
60	17 883333
60	48.298055
	0.804967 *deg.*, the anſwer required.

The common operations in decimals are performed as in the vulgar rules, regard being had only to the particular notation, to diſtinguiſh the integral from the fractional part of a ſum.

In Addition and Subtraction of DECIMALS; the points being all placed under each other, the figures are to be added, and ſubtracted, as in common arithmetic; and when the operation is done, ſo many figures of the ſum, or the remainder, are to be noted for decimals, as there are places of decimals in the greateſt given numbers. An example will make this clear.

Addition of Decimals.

.43791	59.271
.792	15.040
.6124	3.791
.053	12.009
.10	7.5
.2	
2.19531	97.611

Subtraction.

From	67	.9
Take	29	.8754
Rem.	38	.0246
From	25	.1462
Take	13	.07
Rem.	12	.0762

For Multiplication of DECIMALS, obſerve to cut off juſt ſo many decimal parts from the product as there are decimals in both factors. The work is the ſame as in integers. Thus,

Multiplication of Decimals.

.1472	.365	3.650
.175	.122	621
7360	730	3 650
10304	733	73 00
1472	365	2190 0
.0257600	.044530	2266.650

Note. In the firſt and ſecond examples, the products only amount to ſix and five places; for which reaſon cyphers are prefixed to make up the number of decimal places in the two factors reſpectively.

Hence, to multiply a decimal by unit with any number of cyphers, is only to remove the ſeparatrix ſo many places to the right as there are cyphers annexed.

I*n Diviſion of* DECIMALS, proceed in all reſpects as in dividing of integers; and, when the operation is done, mark as many places in the quotient for decimals, as, with the number of decimals in the diviſor, are equal to the decimal places of the dividend.

.22).8030(3.65	22)8.030(.365
66	6 6
143	1 43
132	1 32
110	1 10
110	1 10
. . 0	. . 0

22).8030(.0365	73.2(83.219(1.13
66	73 2
142	100 1
132	73 2
110	26 99
110	21 96
. . .	5 03

Hence, to divide a decimal by unity with any number of cyphers, is only to remove the ſeparatrix ſo many places to the left, as there are cyphers annexed.

But there are certain caſes in diviſion of decimals, which require ſome farther management; as, firſt, where the diviſor is a decimal fraction, and the dividend is an integer; add, or annex, as many or rather more cyphers to the dividend, than there are places in the diviſor; thus, .365)22 0000(60.2. For there being three places or decimals in the diviſor, and four in the dividend, there will be but one in the quotient. Secondly, Where the diviſor is a mixed number, and the dividend a whole number, add at leaſt as many cyphers to the dividend as there are places in the diviſor; thus, 36.5)22.0000(6.02. Thirdly, Wherever the diviſor is bigger than the dividend, annex cyphers to the latter; thus,

36.5)22.0000(.602.

For

For the Valuation of Decimals; multiply the given decimal by the number of parts contained in the propoſed integer, proceeding from the higher to the lower if there be a remainder, and you will have the value required at the left of the ſeparatrix. Thus, .785*l.* is equal to 15*s.* 8*d.* 1.6*f.*

.785	.78 of a yard = 2 feet, 4.08 inches.
20	
s. 15.700	.78
12	3
d. 8.400	*f.* 2.34
4	12
f. 1.600	*in.* 4.08

Decimal *ſcales*, in the general, denote any ſcales divided decimally; but particularly certain ſcales of money, weights, aud meaſures, made from tables ſo called, to expedite decimal arithmetic, by ſhewing by inſpection the decimal fraction of any part of money, weight, or meaſure. See Scale.

DECIMATION, a puniſhment which the Romans uſed to inflict on the ſoldiers who had quitted their poſt, raiſed a mutiny in the camp, behaved themſelves cowardly in the fight, or otherwiſe failed in their duty; for which every tenth man was put to death as an example to the reſt.

The manner of decimating was thus; the general aſſembled the whole camp; then the tribune brought to him thoſe that were guilty, and impeached, and reproached them with their cowardly actions and baſeneſs, in the preſence of the whole army; then putting their names into an urn, or a helmet, as many were drawn out as made the tenth part of the whole number, and theſe were put to the ſword, and the others ſaved.

This was called *decimare*, a word of the ancient Roman militia, who, to puniſh whole legions, when they had failed in their duty, ſometimes alſo made every tenth ſoldier draw lots, and put him to death as an example to the others.

As the Romans had their decimatio, they had alſo the viceſimatio, and centeſimatio, when only the twentieth or hundredth man ſuffered by lot.

This practice has been occaſionally recurred to in modern times; as, particularly, in France, for the puniſhment of the garriſon of Treves in 1675, who capitulated and ſurrendered that place in oppoſition to the remonſtrance of the marſhal de Crequi, who commanded there. There was alſo a decimation during the time of the uſurper in this kingdom in 1655.

DECIMIS *ſolvendis pro poſſeſſionibus alienigenarum*, in *Law*, a writ yet extant in the regiſter, which lay againſt thoſe that had farmed the priors aliens lands of the king, for the rector of the pariſh, to recover the tithe of them. Reg. of Writs, fol. 179.

DECINERS, Decenniers, or Doziners, derived from the French dizeine, *i. e.* decas, *ten;* in the ancient monuments of our *Law*, are ſuch as are wont to have the overſight and check of the friburghs, for the maintenance of the king's peace, the limits of whoſe juriſdiction were called decenna, becauſe it commonly conſiſted of ten houſholds, and dozein; and every perſon bound for himſelf and his neighbours to keep the peace, was ſtiled *decennier*. Bract. lib. iii. tract. 2. c. 15.

Theſe perſons ſeem to have had very large authority in the Saxon times; taking cognizance of cauſes within their circuits, and redreſſing wrongs by way of judgment. Thus Briton, "We will that all thoſe that are fourteen years old ſhall make oath, that they will be ſufficient and loyal to us; and neither be felons, nor aſſenting to felons; and we will, that all profeſs themſelves of this or that dozein, and make or ſuffer ſurety of their behaviour by thoſe or thoſe doziners, except religious perſons, clerks, knights eldeſt ſons, and women."

A dozein now ſeems to be no more than a leet; for in leets only this oath is adminiſtered by the ſteward, and taken by ſuch as are twelve years old and upwards.

DECIO, Philip, in *Biography*, an eminent lawyer, was born at Milan in 1453. At an early age he appears to have been devoted to the belles lettres, but the plague which broke out forced him from his native place and interrupted his ſtudies, when he was but 17 years of age. He retired to Pavia, and, at the deſire of his brother, who was already a profeſſor of the law, he reſolved to follow the ſame courſe of life. He ſoon diſplayed much talent and acuteneſs in diſputation. At Piſa he obtained a doctor's degree in 1476, and was immediately appointed to read lectures on the "Inſtitutions." He was now appointed lecturer extraordinary in the civil law, nnd ſurpaſſed all his contemporaries, in whatever was connected with the duties of his profeſſion. His great reputation excited the jealouſy of his rivals, and he thought it prudent to remove to Sienna, where he had not been long before he was invited to Rome, to accept an office under the pope, which, as it would have rendered holy orders indiſpenſable, he declined, and reſumed the profeſſor's chair at Sienna. From Sienna he went to Piſa, and from thence he went to Padua, where he became profeſſor of canon law; and ſo deſirous were perſons to hear him, that the other ſchools were deſerted, and people of the higheſt rank became his conſtant auditors. When Milan fell under the power of France, Louis XII. reclaimed Decio as a ſubject, but Venice refuſed to part with him. In 1505, he removed to Pavia, where, for ſeven years, he explained the canon law to a numerous and very reſpectable audience. In a difference between pope Julius II. and the French, Decio took part with the latter, and was excommunicated; and what, perhaps, was a ſtill greater trouble to him, his houſe at Pavia was pillaged of every thing that was valuable by the Swiſs troops, who, not contented with this, went alſo to a monaſtery, the aſylum of Decio's natural daughter, and carried away the money that he had aſſigned for her ſubſiſtence. Decio had now no refuge but France; here he was greeted in every town, and received a full compenſation for his various loſſes. His lectures were crowded; and the king created him a member of the parliament of Grenoble. The pope would at this period willingly have been reconciled to him, on condition of his reſiding at Rome, which he thought fit to decline. His next ſituation was profeſſor of the civil law at Valence in Dauphine, with a large ſalary. After various other changes, all honourable to the talents and virtues of Decio, he finiſhed his courſe at Piſa, at the age of 82. He was author of many works in his own profeſſion, which are of little note to the general reader. Gen. Biog.

DECIPHERING, or Decyphering, is the art of diſcovering and explaining what has been written in *cipher*. We have given a copious account of this art under the word Cipher, and have illuſtrated our remarks by ſuitable examples. The authors who are moſt deſerving of notice on this ſubject are Mr. Falconer, Arnold Conrad, and Breithaupt; but the curious reader will alſo find a very methodical and complete ſpecimen of deciphering, in the 35th chapter of Graveſande's "Introductio ad Philoſophiam," printed at Leyden in 1737. No one plan of proceeding, however, can

can be applicable to different fpecies of cipher; and, therefore, none of the above authors will be of much ufe in developing new and intricate modes of fecret-writing. Dr. Wallis, the great mathematician, remarks very juftly, that "all perfons are not qualified or capable of acquiring the art of deciphering, and that a certain degree of *acumen* is requifite for this purpofe."

DE'CISE, or Décize, in *Geography*, a fmall town of France, in the department of the Nievre, and chief place of a canton, in the diftrict of Nevers, on an ifland formed by the Loire, 178 miles S. by E. of Paris. It has 2212 inhabitants, and the canton, which has an extent of $352\frac{1}{2}$ kiliometres, contains 17 communes, and a population of 9686 individuals. This place has an old caftle, a priory, and two convents; it is feated on a rocky ifland near the conflux of the Airon and Loire, in *Bazois*, a diftrict confifting of vallies lying along the hills of Morvan, and abounding in wood and pafturage; 8 leagues from Nevers, and 55 S.E. from Paris.

DECISIVE Oath, in *Civil Law*. See Sacramentum *Decifionis*.

DECIUS, Mus, P., in *Biography*, diftinguifhed for valour and patriotifm, was a military tribune of plebeian rank in the army of C. Coffus about the year B. C. 343, when it was brought into imminent danger of ruin by the Samnites. Decius faw a method of extricating his countrymen; he propofed his plan to the general, which was agreed upon, and which, being inftantly adopted, was crowned with complete fuccefs. He was received by the general and foldiers as their deliverer, and was prefented, for his wifdom and prowefs, with a golden crown, an hundred oxen, and a white bull, from the conful: with an obfidional crown of grafs from the army, and a civic crown of oak from his own detachment. To himfelf he referved only the crowns, and diftributed the other prefents among his brave comrades. Two years afterwards, he was created conful with Manlius Torquatus. In a dangerous war with the Latins, it was agreed between the confuls, that he whofe army fhould give way in battle fhould devote himfelf to death for his country: the event took place in the fucceeding combat, and Decius immediately plunged into the thickeft part of the hoftile forces, where he fell a facrifice to his patriotifm: his body was found the next day buried under the enemy's weapons, and was honourably interred. Livy.

Decius, Mus, P., fon of the preceding, was four times appointed conful, and was, during his fecond confulate, B. C. 308, very fuccefsful againft the Etrurians. Five years afterwards he was elected cenfor with Q. Fabius Maximus, and in the following year he fupported the claim of the plebeians to partake in the pontifical office, and was himfelf chofen into the college of pontiffs. With Fabius he again ferved the office of conful, when they obtained great and very important advantages over the Samnites and their allies. New dangers, to which the republic was expofed from its confederated enemies, called forth the energy of Decius a fourth time as conful. He was oppofed by the Gauls, who, by means of their armed chariots, broke the Roman cavalry, and put the firft line of infantry into the utmoft confufion. When Decius had done all to rally his troops without fuccefs, he determined to imitate the patriotifm of his father by a voluntary devotion of his life to his country's welfare. He called upon the pontiff to perform his part of the ceremony; to which Decius added the folemn prayer, "that he might carry before him terror and flight, blood and flaughter, the wrath of the celeftial and infernal deities, and that the fame fpot might witnefs his own deftruction, and that of the Gauls and Samnites." He then rufhed into the midft of the enemy, and was flain. By this act on the part of the conful, the Romans were excited to new efforts, and the enemy were fo confounded, that the victory was decided in favour of the republic. The names of the Decii have been held up to the world by the moft celebrated poets of antiquity, for a patriotifm and real worth never excelled, and rarely equalled. Rom. Hift.

Decius, emperor of Rome, was born in Pannonia, A. D. 201. We have no particular account of his origin; he probably was advanced to the rank of conful for his fuperior talents. By the emperor Philip he was fent, much againft his inclination, to command the legions in Mœfia and Pannonia, which had been guilty of revolt. Here, inftead of purfuing the orders of his mafter, he affumed to himfelf the imperial title and dignity. He is faid to have been forced to this meafure by the difaffected troops. Philip, however, did not admit the excufe, but immediately marched againft the ufurper; they met near Verona, and a defperate battle enfued, in which Philip was defeated, and killed either in the field, or put to death after he fell into the conqueror's power. This was in the year 249, which may be confidered as the commencement of the reign of Decius. His eldeft fon he immediately raifed to the rank of Cæfar. The reign of this emperor was very fhort; but during the two years which it continued, he inflicted upon the Chriftians the moft cruel perfecutions, in which he omitted no means in his power to fhake the faith of thofe who had embraced the new religion. In other refpects Decius obtained a good reputation: he diftinguifhed himfelf by an expedition againft the Perfians. An invafion of the Goths called forth all the energies of Decius; after much mifchief they fued for peace, but Decius was defirous of terminating the war by a blow: an action was commenced, and almoft inftantly the younger Decius was flain by an arrow: the father, who faw him fall, exclaimed, "be not difcouraged, it is the lofs of one man only," and then rufhed forward to revenge his death. He was, with the greater part of his troops, entangled in a morafs, where furrounded by the enemy, he perifhed under a fhower of darts. He died in 251, aged 50 years. Univ. Hift.

DECK *of a fhip*, from *decker*, Dan. *to cover;* a kind of planked floor, connecting the fides, and ferving as different platforms to fupport the artillery, to lodge the men, and to preferve the cargo in merchant-veffels.

A fhip is faid to have two or three decks, when it contains two or three ftories. Ships of the firft and fecond rates are furnifhed with three whole decks, reaching from the ftem to the ftern, befides a fore-caftle and a quarter-deck, which extend from the ftern to the main-maft. There is alfo another deck above the hinder part of the quarter-deck, called the poop, and ferving as a roof for the captain's cabbin or couch. Inferior fhips of the line of battle have two decks and a half; and frigates, floops, &c. have one gun-deck and a half; with a fpare deck below to lodge the crew. The frame of the lower deck is ftronger than that of the others, becaufe fhips are broader at the lower deck than at the next above it, and it alfo bears the heavieft cannon.

The decks are formed and fuftained by the beams, the clamps, the water-ways, the carlings, the ledges, the knees, and two rows of fmall pillars called ftanchions.

Deck, *Flufh*, is one that lies even in a right line, fore and aft, from ftem to ftern.

The feamen fay, a deck lies cambering, when it doth not lie level, but higher at the middle than at either end. A cambered deck is by no means proper for a man of war. Alfo if the fhip's keel be bent in the middle upwards (which may happen from her lying aground on a place where neither her aft or fore part touch it, and from many other

other caufes taken from her make), they fay fhe is camber-keeled.

Deck, *Half*, is a fpace under the quarter-deck of a fhip of war, between the foremoft bulk-head of the fteerage, and the fore part of the quarter-deck. In the Northumberland colliers, the fteerage is called the half deck, and is ufually the habitation of the fhip's crew.

Deck, a *Rope*, is that made of cordages interwoven, and ftretched over a veffel that has no deck, through which it is eafy to annoy the enemy who comes to board her, and has leaped thereon. Thefe are little ufed but in merchant-veffels, to defend them from the corfairs.

DECKED, or Marguette', in *Heraldry*, a term applied to an eagle or other birds, when their feathers are trimmed at the edges, with a fmall line or purfle of another colour.

DECKENDORF, in *Geography*, a fmall town of Bavaria, in lower Bavaria, in the diftrict of the fame name, with a bridge over the Danube.

DECKER, or Dekher, John, in *Biography*, was born in Flanders about the middle of the fixteenth century. He was educated at Douay, from which place he removed to Rome, where he entered the order of the Jefuits, and thence he went to Naples to complete his ftudies, and to perfect himfelf in theology. As foon as he came back to Rome he took orders, and then went to his native place to teach philofophy and fcholaftic theology. He was afterwards made chancellor of the univerfity of Gratz, in which fituation he died in the year 1619. Decker is famous for his fkill in chronology and hiftory, and publifhed various works chiefly in Latin, which exhibit much erudition and intenfe ftudy: his chief work was entitled "Velificatio, feu theoremata de anno ortus ac mortis Domini, deque univerfa Jefu Chrifti in carne economia, &c. cum tabula chronographica a capta par Pompeium Jerofolyma ad deletam a Tito Urbem et Templum," 1616, 4to. Moreri.

Decker, Francis, a Dutch Phyfician and profeffor in the practice of medicine at the univerfity of Leyden, who flourifhed in the middle of the feventeenth century, was author of feveral works on different parts of medicine, which are ftill occafionally referred to; among them are "Exercitationes practicæ circa medendi methodum," Leid. 1673, 8vo It has been feveral times reprinted. The medicines were firft defcribed, ranged in claffes, with the compofitions into which they enter; then the difeafes, with the method of treating them. In hæmoptoe the author frequently experienced good effects from the Dulcamara. He publifhed an edition of the "Praxis Babettiana, with Notes and Obfervations," 1669, Leid. 8vo. In a mild apoplexy, he excited falivation by mercurial frictions with advantage. He does not fay how long the frictions were continued before the effect was produced. In the fame difeafe are recommended the refin of colocynthis, and the extract of black hellebore, with more probability of fuccefs. In lethargy he ufed the turbith mineral as an errhine. This is now ufed, and with advantage. Haller Bib. Med.

DECKINGEN, in *Geography*, a fmall town of Wurtemberg, on the river Fils, in the diftrict of Wiefenfteig.

DECLAMATION, a difcourfe or fpeech made in public, in the tone and manner of an oration.

Among the Greeks, declamation was the art of fpeaking indifferently on all fubjects, aud on all fides of a queftion; of making a thing appear juft that was unjuft; and of triumphing over the beft and founde ft reafons.

Such fort of declamations, M. de St. Evremond obferves, were only fit to corrupt the mind, by accuftoming men, to cultivate their imagination rather than to form their judgment, and to feek for verifimilitudes to impofe upon rather than folid reafons to convince the underftanding.

It is faid that a certain orator, named Plotius Gallus, firft introduced the ufe of declamations at Rome. In this way Cicero formed himfelf for eloquence. The term frequently occurs both in Horace and Juvenal.

Among us, declamation is reftrained to certain exercifes which fcholars perform, to teach them to fpeak in public.

We fay, a declamation againft Hannibal, againft Pyrrhus, the declamation of Quintilian, &c.

In the colleges of the Jefuits, declamations are little theatrical or dramatic performances, confifting of a few fcenes not divided into acts, rehearfed by the ftudents by way of exercife, and to form them for fpeaking in public. Such declamations are the moft ufeful exercifes performed in the colleges.

Declamation, *Mufical*. See Recitative.

DECLAMATORY Style. See Style.

DECLANA, or Deciana, in *Ancient Geography*, a town of Spain, in the Tarraconenfis, and territory of the Endigatæ, according to Ptolemy, and the tables of Pentiager.

DECLARATION, in the *Cuftom Houfe and Commerce of France*, contains a particular account or invoice of what is contained in the bales or cafes, brought to the officer for entrance inward or outward.

Declaration, in *Law*, called alfo *narratio* or *count* and anciently the *tale*, the act of fhowing in writing the caufe of complaint of the demandant, or plaintiff, againft the defendant, where he is fuppofed to have received fome wrong.

This is merely an amplification or expofition of the original writ upon which the action of the plaintiff is founded, with the additional circumftances of time and place, when and where the injury was committed. In the king's bench, when the defendant is brought into court by a bill of *Middlefex*, upon a fuppofed trefpafs, in order to give the court a jurifdiction, the plaintiff may declare in whatever action, or charge him with whatever injury he thinks proper; unlefs he has held him to bail by a fpecial *ac etiam*, which the plaintiff is bound to purfue. And fo alfo, in order to have the benefit of a *capias* to fecure the defendant's perfon, it was the ancient practice, and is therefore ftill warrantable in the common pleas, to fue out a writ of trefpafs, *quare claufum fregit*, for breaking the plaintiff's clofe, and when the defendant is once brought in upon this writ, the plaintiff declares in whatever action the nature of his true injury may require; as in an action of covenant, or on the cafe for breach of contract, or other lefs forcible tranfgreffion; unlefs by holding the defendant to bail on a fpecial *ac etiam*, he has bound himfelf to declare accordingly.

In *real* actions, when poffeffion of land is to be recovered, or damages for an actual trefpafs, or for wafte, &c. affecting land, the plaintiff muft lay his declaration, or declare his injury to have happened in the very county and place where it did really happen; but in *tranfitory* actions, for injuries that might have happened any where, as debt, detinue, flander, and the like, the plaintiff may declare in what county he pleafes, and then the trial muft be had in that county in which the declaration is laid. Though if the defendant will make affidavit, that the caufe of action, if any, arofe not in that but in another county, the court will direct a change of the *venue* or *vifne* (that is, the *vicinia*, or neighbourhood in which the injury is declared to be done), and will oblige the plaintiff to declare in the other county; unlefs he will undertake to give material evidence in the firft. For the ftatutes 6 Rich. II. c. 2. and 4 Hen. IV. c. 18. having ordered all writs to be laid in their proper counties, this, as the judges conceived, empowered them to change the

the *venue*, if required, and not to inſiſt rigidly on abating the writ, which practice began in the reign of James I. And this power is diſcretionally exerciſed, ſo as to prevent and not to cauſe a defect of juſtice. Therefore the court will not change the *venue* to any of the four northern counties, previouſly to the ſpring circuit; becauſe there the aſſizes are holden only once a year, at the time of the ſummer circuit. And it will ſometimes remove the *venue* from the proper juriſdiction (eſpecially of a narrow and limited kind), upon a ſuggeſtion, duly ſupported, that a fair and impartial trial cannot be had therein. (Stra. 874.)

In actions upon the caſe, it is generally uſual to ſet forth ſeveral caſes by different counts in the ſame declaration; ſo that if the plaintiff fails in the proof of the one, he may ſucceed in another. And if he proves the caſe laid in one of his counts, though he fails in the reſt, he ſhall recover proportionable damages. This declaration always concludes with theſe words, "and thereupon he brings ſuit, &c." "*inde producit ſectam*, &c." But the actual production of the ſuit, the *ſecta*, or followers (*i. e.* the witneſſes) of the plaintiff), according to the ancient uſe of the term, is now antiquated; and hath been totally diſuſed, at leaſt ever ſince the reign of Edward III., though the form of it ſtill continues.

At the end of the declaration are added the plaintiff's common pledges of proſecution, John Doe and Richard Roe, which are now mere names of form, though formerly they were of uſe to anſwer to the king for the amercement of the plaintiff, in caſe he were nonſuited, barred of his action, or had a verdict and judgment againſt him. (3 Bulſtr. 275. 4 Inſt. 189.) For if the plaintiff neglects to deliver a declaration for two terms after the defendant appears, or is guilty of other delays or defaults againſt the rules of law, in any ſubſequent ſtage of the action, he is adjudged "not to follow" or purſue his remedy, as he ought to do; and thereupon a *nonſuit* or *non proſequitur* is entered; and he is ſaid to be *nonpros'd*. And for thus deſerting his complaint, after making a falſe claim or complaint *(pro falſo clamore ſuo)*, he ſhall not only pay coſts to the defendant, but is liable to be amerced to the king.

When the plaintiff hath ſtated his caſe in the declaration, it is incumbent on the defendant within a reaſonable time to make his defence (ſee Defence), and to put in a plea (ſee Plea); elſe the plaintff will at once recover judgment by *default*, or *nihil dicit* of the defendant. Blackſt. Com. b. iii.

In all notices of declarations, the cauſe ſhould be properly named, as well as the court in which the ſuit is inſtituted; and the nature of the action is alſo to be expreſſed, and at whoſe ſuit proſecuted; and the time limited to plead to ſuch declaration. R. T. 1 Geo. II.

On filing declarations, copies of them are ſerved on the defendants, or their attornies, &c. And by an order of all the judges, (12 W. III.) the plaintiff's attorney is not obliged to deliver the defendant's attorney the original declaration; but inſtead of it, is to deliver a true copy of the declaration; upon delivery or tender of which, the defendant's attorney ſhall pay for ſuch copy after the rate of 4*d.* per ſheet, &c.; and if any perſon refuſe to pay for the copy tendered, the ſaid copy is to be left in the office, with the clerk that keeps the files of declarations, and thereupon the plaintiff's attorney giving rule to plead, may, for want of a plea, ſign judgment; and before any plea ſhall be received, the defendant's attorney is to pay for the copy of the declaration. See alſo Trin. 2 Geo. II. There are ſeveral other rules of court as to the filing and delivering of declarations, &c. which may be found in the ſeveral books of practice. Jacob's Law Dict. by Tomlins, art. *Declaration*.

Declaration *of fidelity*, is uſed for a confeſſion, which the quakers, who ſcruple taking the oath of ſupremacy, &c. are obliged to make and ſubſcribe in lieu thereof.

Its tenor is a ſolemn promiſe to be true and faithful to king George; with a deteſtation and horror of that damnable poſition, that princes excommunicated by the pope, or any other power, may be depoſed or murdered; and a declaration that no foreign prince, or power, has any right, juriſdiction, or anthority, in this kingdom.

There is alſo a declaration againſt tranſubſtantiation made and ſubſcribed by thoſe who qualify for offices; 25 Car. II. c. 2. and a declaration againſt popery to be made and ſubſcribed by the members of both houſes of parliament, by diſſenters qualified according to the toleration act, &c. &c. in which they renounce tranſubſtantiation, the invocation of ſaints and of the Virgin Mary, and the ſacrifice of the maſs, and every kind of evaſion, and mental reſervation, as well as diſpenſation or abſolution. 30 Car. II. ſtat. 2. c. 1.

Declaration of *War*, a public proclamation made by the herald at arms, to the members or ſubjects of a ſtate, declaring them to be at war with any foreign prince, and forbidding all of them to aſſiſt the common enemy at their peril.

Declarations, *Clerk of the*. See Clerk.

DECLARATORY *part of a Law*, is that by which the rights to be obſerved, and the wrongs to be avoided, are clearly defined and laid down. This depends not ſo much on the law of revelation or of nature, as on the wiſdom and will of the legiſlator. The rights which God and nature have eſtabliſhed, called natural rights, ſuch as life and liberty, receive no additional ſtrength when declared by the municipal laws to be inviolable. Indeed, no human legiſlature has power to abridge or deſtroy them, unleſs the owner himſelf ſhall commit ſome act that amounts to a forfeiture. Neither do divine or natural duties, ſuch as the worſhip of God, the maintenance of children, &c. receive any ſtronger ſanction from being alſo declared to be duties by the law of the land. The caſe is the ſame with regard to crimes and miſdemeanors, that are forbidden by ſuperior laws, and therefore ſtyled "mala in ſe," ſuch as murder, theft, perjury, which contract no additional turpitude from being declared unlawful by the inferior legiſlature. Upon the whole, the declaratory part of the municipal law has no force or operation at all, with regard to actions that are naturally or intrinſically right or wrong. But the caſe is entirely altered with reſpect to things that are in themſelves indifferent. Theſe become either right or wrong, juſt or unjuſt, duties or miſdemeanors, according as the municipal legiſlator ſees proper, for promoting the welfare of ſociety, and more effectually carrying on the purpoſes of civil life. Such are the declarations of common law, that the goods of the wife do inſtantly upon marriage become the property and right of the huſband; and the declaration of our ſtatute law, that all monopolies are a public offence. Thus alſo with regard to civil duties, obedience to ſuperiors is the doctrine of revealed as well as natural religion; but who thoſe ſuperiors ſhall be, and in what circumſtances, and to what degrees they ſhall be obeyed, it is the province of human laws to determine; and ſo, as to injuries or crimes, it muſt be left to our own legiſlature to decide, in which caſes the ſeizing of another's cattle ſhall amount to a treſpaſs or a theft; and where it ſhall be a juſtifiable action, as when a landlord takes them by way of diſtreſs for rent. Blackſt. Com. vol. i. Introd.

Declaratory *part of a Statute*, is that which relates to obſolete or diſputable cuſtoms: in which caſe the parliament has

has thought proper, *in perpetuum rei teſtimonium*, and for avoiding all doubts and difficulties, *to declare* what the common law is and ever hath been. Thus the ſtatute of treaſons, 25 Edw. III. c. 2. doth not make any new ſpecies of treaſon; but only, for the benefit of the ſubject, declares and enumerates thoſe ſeveral kinds of offence, which before were treaſon at the common law.

DECLENSION, in *Grammar*, the inflexion of a noun, according to its diverſe caſes. See Case, Nominative, &c.

Mr. Harris obſerves, that the Peripatetics likened the noun in its primary and original form, to a perpendicular line; and the variations from the nominative were conſidered as if that line *fell* from its perpendicular to an oblique poſition: and hence the variations were called πτώσεις, *caſus*, *caſes*, or *fallings*. Grammarians were thus led to call the method of enumerating the various caſes of a noun κλίσις, *declinatio*, *a declenſion;* becauſe it was a ſort of progreſſive deſcent from the noun's upright form, through its various declining forms. Hermes, p. 277. 278.

The declenſion of nouns is a different thing in the modern languages, which have not properly any caſes, from what it is in the ancient Greek and Latin, which have.

Declenſion in languages, wherein the nouns admit of changes, whether in the middle, beginning, or end, is properly the expreſſing or reciting all thoſe changes in a certain order, and by certain degrees, called *caſes*.

In languages wherein the nouns do not admit of changes in the ſame number, declenſion is the expreſſing of the different ſtates or habitudes a noun is in, and the different relations it has: which difference of relations is marked by particles called *articles;* as, *a*, *the*, *of*, *to*, *from*, &c.

Declension *of a diſeaſe*, is when it is paſt its height, and the ſymptoms abate.

DECLINATION, *of a celeſtial object*, in *Aſtronomy*, is its angular or perpendicular diſtance from the equator, meaſured on a meridian or great circle paſſing through the object and the poles of the heavens.

A great circle paſſing in this manner through the poles, (and therefore perpendicular to the equator), is called a circle of declination.

Declination on the celeſtial globe, correſponds with latitude on the terreſtrial. And in the ſame manner as the geographical ſituation of a place is known, when its longitude and latitude are given, ſo in the heavens the place of a ſtar is determined, when its right aſcenſion and declination are known. To find, therefore, by obſervation the right aſcenſion and declination of a heavenly body is a problem of the firſt importance in practical aſtronomy. And moſt of the principal inſtruments in modern obſervatories are conſtructed with a view to one or other of theſe operations.

One of the moſt obvious methods of determining the declination of a ſtar is by means of its meridian altitude; for if this be given, and the latitude of the place known, the declination is eaſily calculated by the following rule:

When the latitude of the place and zenith diſtance of the ſtar are of different kinds, namely, one north, and the other ſouth, their difference will be the declination, and it is of the ſame kind as the latitude, when that is the greateſt of the two; otherwiſe it is of the contrary kind. If the latitude and zenith diſtance are of the ſame kind, *i. e.* both north or both ſouth, their ſum is the declination, and it is of the ſame kind as the latitude. But it will be found much more convenient to follow the method of many modern aſtronomers, who claſs the ſtars according to their north polar diſtance.

The declinations of all the celeſtial bodies are continually varying. To obſerve and explain the cauſe of theſe changes peculiarly belongs to the ſcience of aſtronomy.

The change of declination in the ſun ariſes from his motion in the ecliptic. When the obliquity of the ecliptic and the ſun's longitude are known, the declination is eaſily calculated by the ſolution of a right angled ſpherical triangle; or if the declination is obſerved, the ſun's longitude may be found by the ſame method. Twice a year, namely, at the equinoxes, the ſun has no declination; and twice a year, at the ſolſtices, his declination is the greateſt, being then equal to the obliquity of the ecliptic.

The declination of the moon varies in a ſimilar manner to that of the ſun, but more rapidly, as its revolution is performed in a ſhorter time. The ſame changes that are obſerved to take place in the declination of the ſun in the courſe of a year, occur to the moon in the ſpace of a month. Twice during this period the moon croſſes the equator, and therefore has no declination, and twice its declination is at a maximum. But the quantity of its greateſt declination, in one revolution, is exceedingly variable, being ſometimes equal to the *ſum* of the obliquity of the ecliptic, and the inclination of the moon's orbit to the ecliptic; at other times, only equal to the *difference* of theſe quantities. This is occaſioned by a retrograde motion of the moon's nodes, which ſucceſſively change their place throughout the ecliptic in the ſpace of about eighteen years.

The greateſt and leaſt declinations, both north and ſouth, happen when the nodes are in the equinoctial points. This will be eaſily underſtood by conſulting a celeſtial globe, or by referring to *Plate* V. *Aſtronomy*, *fig.* 44, where ♈ ♎ ♈′ repreſents the equator. When the aſcending node is in ♈, the moon's orbit lies above or without the ecliptic as ♈ *m* ♎ *n* ♈′ and its greateſt declinaton, *m p*, is equal to the obliquity of the ecliptic, plus *m c*, the inclination of the moon's orbit, her ſouthern declination, *p′ n*, is at the ſame time likewiſe a maximum; but when the deſcending node arrives at ♈ (by the retrograde motion above mentioned) the moon's orbit lies within the ecliptic, and its greateſt declination in the courſe of the month is *m′ p* and *p′ n′*, or the difference between the obliquity of the ecliptic and the inclination of the moon's orbit.

The declinations of the planets likewiſe vary from the intricate combinations of their reſpective motions with that of the earth. The declinations of the planets which are neareſt to us vary more rapidly, and with a greater apparent irregularity than thoſe more remote.

The changes that take place in the declinations of the fixed ſtars, are more uniform than any of thoſe above-mentioned, and ariſe principally from the retroceſſion of the equinoctial points This motion, if uniform, would affect the longitude of every ſtar equally and uniformly, but the declination of a ſtar being its poſition relative to a different circle to that in which its motion in longitude is performed, the declination of ſome ſtars will be more affected by this retroceſſion than that of others. When the motion in longitude of a ſtar is nearly parallel to the equator, the declination is but little affected. This happens to thoſe ſtars which have 6 or 18 hours of right aſcenſion. The greateſt change takes place in thoſe ſtars which have 0 or 12 hours right aſcenſion.

Beſides this change of declination common to all ſtars, many of them have motions peculiar to themſelves. This is called their proper motion in declination: it is found by comparing obſervations made at very diſtant periods from each other. Theſe proper motions do not appear to follow any certain rule depending on their ſituation, yet Dr. Herſchel thinks many of them may be explained by ſuppoſing a motion

motion in the whole folar fyftem directed to a particular point in the heavens. The proper motion of each ftar in declination is found by comparing its prefent place with that determined feveral years fince: if its change in declination is only equal to that which fhould take place from the calculated preceffion, we prefume the ftar to have no proper motion; but if any difference fhould be found between its calculated and obferved declination, and particularly if it exceed the probable errors of obfervation, then we fuppofe that difference to arife from the proper motion of the ftar. We have annexed Dr. Bradley's catalogue of ftars, obferved about the year 1756, as they afford the moft exact term of comparifon for modern obfervations.

The moft ancient method of determining the declination of the fun or moon, was by means of a gnomon or fhadow; and till telefcopes were applied to aftronomical inftruments, a more exact method could not eafily have been devifed.

Triangular or parallactic rules were ufed by Ptolemy, and the Arabian aftronomers.

Mural quadrants have been employed in the moft celebrated obfervatories of Europe for this purpofe, till the late improvements in the conftruction of aftronomical circles have rendered it highly probable that the ufe of the quadrant will be entirely difcontinued. For this reafon, every thing here which relates to the practice of finding the declinations of celeftial bodies, is intended only to apply to aftronomical circles. The reader is referred to the article *quadrant*, for fuch corrections as are peculiar to that inftrument.

Armillary fpheres were ufed by the ancients, and equatorial inftruments, which bear fome refemblance to them, by the moderns, to obferve the declinations of heavenly bodies, out of the meridian; but fuch obfervations are only fuited to accidental cafes, fuch as for comets or planets when they cannot be feen on the meridian. All obfervations intended to ferve as a foundation for aftronomy fhould be made when the object is on the meridian.

Method of obferving Declinations with the aftronomical Circle.

If the inftrument is conftructed with an azimuth circle, this fhould be firft placed in a horizontal pofition; this verification, though not abfolutely neceffary, fhould not be omitted. It is performed by bringing any one of the levels of the inftrument into a line parallel with any two of the feet fcrews, the bulb of the level being made to reft in a central pofition; the inftrument is next to be moved half round in azimuth, and if the level has changed its pofition, half the deviation is to be corrected by either of the feet fcrews that are parallel to it, and the other half by any fcrew that moft conveniently acts on the level. The level muft next be brought perpendicular to its firft pofition, and the whole of its deviation corrected by the other foot-fcrew.

The axis of the circle fhould next be made horizontal. This is known to be accomplifhed, when the hanging level remains ftationary during a whole revolution of the circle round its horizontal axis. Sometimes the level is not fixed to the axis, but only intended to be occafionally applied to the pivots; in this cafe it muft be reverfed end for end, and if the bulb of the level refts at the fame point in each pofition, the axis is horizontal.

The pofition of the micrometer wire fhould now be examined, a diftinct object fhould be bifected, and the whole inftrument moved gently in azimuth by the tangent-fcrew of the azimuth circle. The object fhould remain bifected in every part of its apparent motion through the field of the telefcope; if it does not, the micrometer muft be moved in its cell till this is effected. When the circle does not move in azimuth, this verification may be performed by the vertical wire, taking for granted that the horizontal wire is at right angles to it, or it may be examined, by obferving if a ftar in the equator continues bifected during its paffage through the field of the telefcope.

The line of collimation fhould next be made to defcribe a great circle of the fphere. This is done when the inftrument admits of it by reverfing the circle in its Y's, and obferving if the fame object is bifected in each pofition; when this cannot be done, the inftrument muft be turned half round in azimuth; by this means the line of collimation is rendered perpendicular to the horizontal axis.

We will now fuppofe that the mechanical adjuftments have been accurately performed, and the inftrument placed in the meridian, and that the object of the obferver is to undertake a courfe of obfervations for the purpofe of determining the declinations of the fixed ftars, and other celeftial objects.

Some time before the ftar is expected on the meridian, the telefcope fhould be directed nearly to the place of the ftar, fo that it may pafs through the field; this may eafily be done, as the latitude of the place is always fuppofed known within a few minutes. The plumb-line point fhould be accurately bifected, and the inftrument carefully protected from the fun, and from unequal currents of air. Solar obfervations fhould always be omitted, where they do not form an effential part of the object of inveftigation, as they have a great tendency to derange fome of the nicer adjuftments of thefe inftruments.

As foon as the ftar appears in the telefcope, it fhould be brought to the middle wire by the micrometer fcrew, which gives motion to the whole inftrument. The plumb line fhould now be again examined, and the bifection of its dot or point made with all imaginable precifion; the ftar will now probably be very near the middle wire, and fhould be bifected by the micrometer-fcrew; and in effecting this, great care fhould be taken to avoid all undue preffure either forward or fideways, which might derange the plumb line. The preffure of the finger and thumb fhould be wholly directed towards the centre of the head of the fcrew. The ftar and the plumb-line fhould be alternately examined; and when both remain fteadily bifected, the obfervation may be confidered as good. If the ftar is near the equator, it will continue bifected for fome time; but if its declination be confiderable, it is effential to accomplifh the bifection near the middle wire. The obfervation fhould be immediately read off at each microfcope, and the fame precaution fhould be obferved in the management of their fcrews, as was recommended above in the ufe of the micrometer-fcrew.

With tranfit circles, not fixed on ftone-piers but on frame work, fuch as defcribed by Mr. Wollafton, vide Circle, and Ph. Tranf.; this method of bifecting the plumb-line point, and the ftar, at the fame inftant, cannot be adopted; and fo much muft depend on the ftability of every part of the inftrument, that it is not much to be wondered at that thefe inftruments have not been very fuccefsful.

The ftate of the barometer and thermometer (the latter within the tube of the telefcope, if poffible) fhould be noted down.

It is eafy to fee that by this obfervation alone, the obferver can derive no information either with refpect to the declination of the ftar or the latitude of the place. But if, on the fame night, an obfervation can be obtained of the pole ftar, or any other circumpolar ftar, both above and below the pole, the polar diftance of any other ftar may be deduced by a direct comparifon, without any reference to the real altitude or zenith diftance of either of them, provided the altitude is known near enough for the purpofe of calculating the refractions.

tions. And here it may be remarked, that if the inſtrument does not turn freely in azimuth, this mode of obſerving polar diſtances, by reference to the polar point on the inſtrument, will be found very convenient in practice, and often preferable to the uſual mode of ſuppoſing the true zenith diſtance and latitude known. But if the inſtrument revolves freely in azimuth, then having obſerved ſeveral ſtars, in the manner above deſcribed, the inſtrument ſhould be turned half round in azimuth, and the plumb-line point biſected. The circle ſhould on no account be handled more than is abſolutely requiſite for this operation. The ſame ſtars that were obſerved in the firſt poſition ſhould now be obſerved again in preciſely the ſame manner, but the microſcopes will not indicate the ſame quantities. If in the firſt poſition they gave zenith diſtances, they will now give altitudes; or, if one miſcroſcope is made to mark the zenith diſtance, and the other the altitude, they will be now reverſed, and the one which gave zenith-diſtance will now give altitude. When the ſtars have been thus obſerved two or three times in each poſition, the obſerver will be enabled to judge both of the perfection of his inſtrument, and of his own ſkill in the management of it. For in calculating the above obſervations, he ſhould begin by deducing the index error, or error of collimation, from each ſtar ſeparately; and the difference of the quantities thus found ſhould, if the inſtrument and obſervations are good, be contained in very narrow limits.

Half the extreme difference will be very nearly the greateſt error to which the obſervations will be liable.

Upon this ſubject, vid. Ph. Tranſ. 1806.

To illuſtrate this, we ſhall take for example ſome obſervations made with an aſtronomical circle of two feet diameter, conſtructed by Mr. Troughton, and which moved freely in azimuth.

		Altitude.
6th Sept. Rigel,	Poſ. E.	30° 21′ 36″.25
7th	E.	30 21 40
	Mean,	30 21 38.1
8th	Poſ. W.	30 20 22.5
9th	W.	30 20 23.5
	Mean,	30 20 23.
Difference between E. and W.		0 1 15.12
Half, or error of Coll.		0 0 37.5
True altitude,		30 21 00.5
Sirius,	W.	22 20 40
	E.	22 20 1
		0 1 21
Error of Col.		0 0 40″.5
True Altitude		22 21 20.5
ϑ Sagittæ.	W.	8 56 45.8
	E.	8 58 7.1
		0 1 21.3
Error of Coll.		0 0 40.6
True altitude		8 57 26.4
ϰ	W.	31° 18′ 54″.7
	E.	31 20 15 .7
		0 1 24
Error of Coll.		0 0 42
True altitude		31 19 36.7
α Cap.	W.	25 38 41 7
	E.	0 40 00.6
		0 1 18.9
Error of Coll.		0 0 39.45
True altitude		25 39 21.15
θ	W.	18 9 39.25
	E.	18 10 54. 5
		0 1 14.25
Error of Coll.		0 0 37.12
True altitude		0 10 16.37
γ	W.	21 13 53
	E.	21 15 7.7
		0 1 14.7
Error of Coll.		0 0 37.35
True altitude		21 14 30.35
ϑ	W.	21 45 39.75
	E.	0 46 55. 5
		1 15 7. 5
Error of Coll.		0 0 37.87
		21 46 17. 6

	Error of Coll.	Number of Obſ.
Rigel	37″.5	4
Sirius	40. 5	3
ϑ Sagittæ	40. 6	3
ϰ	42. 0	2
α Cap.	39.45	3
θ	37.12	2
γ	37.35	2
ϑ	37.87	2
Mean Error of Collimation	39. 0	

From this it ſhould appear that 3″ was probably the greateſt error committed in the determination of the altitudes of the above ſtars, including errors of every kind. Had the obſervations been continued, the diſcordance would have been leſs, as the errors of obſervation would have been gradually done away, and the errors of diviſion only would have remained.

The

The index error being thus found, may be applied to any ſtar or planet that has been obſerved only in one poſition of the inſtrument. A well divided circle of two feet diameter will, in the hands of a careful obſerver, always give declinations true to 2″ or 3″.

The zenith diſtances being brought up to the beginning of the year, ſhould be regiſtered in a table. The polar diſtance is obtained by applying the co.-lat. of the place of obſervation; but this ſhould be conſidered as an equation known at firſt only as an approximation to the truth. Many months may elapſe before an obſerver, who is anxious to attain perfection, will be ſatisfied with the accuracy of this eſſential element in his calculations. In uſing large inſtruments on ſtone piers, which cannot be reverſed without great danger of diſturbing their adjuſtments, the method of finding the Polar-point on the circle, and referring all obſervations to it, is preferable to the other; and here the obſerver muſt be as ſcrupulous in his attention to aſcertain this point accurately, as to find the latitude in the uſual method. Obſervations of circum-polar ſtars are in each caſe to be ſelected for the purpoſe.

Of the Corrections to be applied to the Obſervations.

Theſe are of two kinds, one depending on the mechanical conſtruction of the inſtruments, the other entirely aſtronomical, and intended to reduce the apparent altitude as ſeen at the place of the obſerver, to that which would have been obſerved from ſome other ſituation, as the centre of the earth; or even at ſome other period, as the beginning of the year.

The corrections ariſing from the conſtruction of aſtronomical circles are very few, as theſe inſtruments have the means of avoiding moſt of the deviations that quadrants are ſubject to. The index error, as above deſcribed, is the principal correction in ſingle obſervations; and half the thickneſs of the wire of the micrometer ſhould be taken into the calculation, where one of its edges has been made a tangent to the upper or lower limb of the ſun, moon, or planet. But when the micrometer is formed by fine cobweb, this method need not be adopted.

The corrections for reducing the apparent zen. diſt. at the time of obſervation, to the true zen. diſt. as ſeen from the centre of earth, for the beginning of the year, ariſe from refraction, parallax, aberration, nutation, preceſſion, and ſemi-annual ſolar-equation. For an explanation of theſe corrections, ſee the reſpective articles Aberration, Nutation, &c. &c.

Among the tables ſubjoined will be found thoſe of the Rev. Mr. Wollaſton, which are much the moſt convenient of any that have yet been publiſhed for reducing obſervations of this kind. By means of theſe tables the obſerver will be enabled, with the greateſt eaſe, to regiſter all his obſervations, with their reſpective corrections, in one column, which will greatly facilitate all the ſubſequent calculations.

It ſometimes will happen, that an obſervation cannot be taken, at the preciſe moment the ſtar is on the meridian, but a few minutes before or after. If the inſtrument moves in azimuth, it ſhould be made to follow the ſtar; and if the ſtar is on the middle of the field, when the obſervation is made, no other correction is required than for the change of altitude in the ſtar, for the given interval, which will be found in the tables for the uſe of the French repeating circle. But in a fixed inſtrument, the only obſervation that can be had, may be when the ſtar has conſiderably paſſed the centre of the field, in this caſe a double correction muſt be applied. The firſt to reduce the obſerved altitude, to that which would have been given by the inſtrument, if the ſtar had been obſerved on the vertical wire; the ſecond is the ſame as above mentioned, namely, to allow for the change of altitude in the ſtar ſince the moment of its tranſit over the meridian. The firſt correction is given in Tab. XXI. The argument on the left hand column is the altitude, and on the top the diſt. from the vertical wire.

To obſerve the Declination of the Sun.

This obſervation requires the following corrections: error of collimation, refraction, parallax, ſemidiameter of the ſun, and for half the thickneſs of the micrometer wire, when it is made a tangent to the limb of the ſun. Theſe quantities are eaſily taken from the annexed tables. The ſemidiameter of the ſun will vary according to the power of the teleſcope, ſo that it is adviſeable to obſerve ſometimes the upper, and ſometimes the lower limb. If the circle is of ſmall dimenſions, and turns eaſily in azimuth, two or more obſervations may be obtained in one day, an allowance being made for the ſun's motion in altitude, according to ſuch rules as will be given when we come to treat more particularly of the French repeating circle. In obſerving the ſun, the inſtrument ſhould be carefully protected from its rays till the moment of obſervation.

Example of an Obſervation of the Sun, made at Weſtbury in Somerſetſhire, with a circular Inſtrument conſtructed by Mr. Troughton.

1801. 21 June.			
⊙ U. L. - -	62°	30′	30″.5
Error of coll. - -	0	0	34.5
	62	29	56
Apparent zen. diſt. -	27	30	4
Refraction - - -	0	0	29
	27	30	33
Parallax - - -	0	0	4
	27	30	29
Semidiameter ⊙ - -	0	15	47
	27	46	16
Lat. of the place of obſervation	51	14	17
Declination of the ⊙ -	23	28	1
1801. 22 June.			
Zen. diſt. ⊙ L. L. -	28	2	7.5
	0	0	34.5
Error of Coll. - -	28	1	33
Refraction - - -	0	0	30.1
	28	2	3
Parallax - - -	0	0	4
	28	1	59
Semidiameter ⊙ -	0	15	47
	27	46	12
Latitude - -	51	14	17
	23	28	5

The mean of theſe two obſervations will give the declination of the ⊙ at the intermediate midnight very accurately = 23° 28′ 3″.

The

The corrections to be applied to the observation of the meridian altitude of a fixed star to find its mean declination at the beginning of the year, are those depending on refraction, precession, aberration, nutation, and semi-annual solar equation.

When it is intended to observe the same stars frequently, it will be found very convenient to make a table of their mean refractions, with the change for each degree of the thermometer, and for each tenth of an inch of the barometer, as given in Mr. Wollaston's tables, which are here subjoined.

Example. γ *Pegasi.*

	Observation Cor. for Refract.	Barom.	Ther	Refrac.
1800.		Inches.		
Nov. 3.	142° 50′ 27″.5	29.2	51°	42″.48
7.	37 9 27 .8	29.2	51	42 .81
11.	37 9 26 .9	29.6	48	43 .37

Mean refraction	-	43″.15
Barometer	-	.14
Thermometer	-	.11

Nov 3.	142°	50′	27″.5
Nov. 7 and 11, or Nov. 9.	37	9	27.4
Sum	179	59	54.9
	180	0	0
			5.1
Error of Coll.			2.55
Z. D. Nov 6. =	37	9	29.95
Aber. and Prec.			+25.5 } +23.7
Nut.			− 1.8
	37	9	53.5
Co. lat.	38	45	43
Polar distance, Jan. 1800	75	55	36.5

α *Lyræ.*

1800.	Observation.	Bar.	Ther.	Ref.
Oct. 31.	12° 37′ 42″.6	29″.9	50″	12″.7
Nov. 3.	167 22 9. 6	29.2	51	12.6

Mean refraction		12″.75
Barometer	-	.04
Thermometer	-	.03

	12°	37′	42″.6
	167	22	9.6
	172	59	52.2
	180		
			7.8
Error of coll.	-		3.9
	12	37	46.5
Ab. and Prec.			+ 15.3 } + 7
Nut.			− 8.3
Carried over	12	37	53.5

Brought over	12°	37′	53″.5
	38	45	43
Polar dist. Jan. 1800 -	51	23	36.5

When the meridian altitude or zen. distance of a planet is observed: the calculation for finding its declination differs but little from that of a fixed star, except that the correction for parallax and aberration must be taken from the tables of the planet. If one of the principal fixed stars passes nearly at the same time, differing but little in altitude, the declination of the planet had better be calculated by comparing it with the fixed star.

Observations made to determine the declination of the moon require some corrections that should be particularly explained. It is usual to observe either the upper or lower limb. If we wish to know what would have been the *observed* altitude of the centre, we must employ the semidiameter augmented according to its altitude, and diminished by the difference of refraction corresponding to the limb and the centre; or, we may proceed to calculate the declination of the observed limb. This latter method we think preferable to the other.

The correction for parallax varies according to the altitude of the moon, and is subject to a small equation depending on the latitude of the place, as will be more fully explained under Parallax: enough for the present purpose will be understood by referring to *Plate* V. *fig.* 45.

O represents the place of the observer, on the elliptic meridian, E P Q *p*. O *m*, the normal or continuation of the direction of the plumb-line; Z, the zenith; H *h*, or H′ *h*′, the horizon; the angle observed is M O Z, or its compl. M O H′. The declination of the lower limb required is the angle M C E. If the moon were in the line Z O, it would have no parallax, and its zenith distance would equal the angle which the vertical, O *m*, makes with the radius. If the moon were in the zenith Z, it would nevertheless have a small parallax.

The equatorial parallax must be diminished in the proportion of E C to O C.

Example, taken from the Greenwich Observations.

Sept. 1. 1806. The zenith distance of the moon's upper limb was observed 38° 48′ 32″.3. The error of collimation was 2″.9, and the error of the arc, (vide note to observations) was 1″ additive. The refraction was 45″.1.

These corrections make the zenith distance 38° 49′ 21″.3.

The equatorial parallax by the tables was at that time 55′ 30″; this diminished in the proportion of E C to O C (by Table XX.) is 55′ 24″, which is the horizontal parallax at Greenwich: this multiplied by the sine of the zenith distance *minus* the angle which the radius makes with the vertical, or the angle C O *m* = 10′ 3″ (Tab. XX.) gives 34′ 36″.2 for the parallax in alt. which is to be subtracted from the zenith distance, and leaves 38° 14′ 45″.1.

The same tables which give the equatorial parallax 55′ 30″, give the semidiameter 15′ 8″.8, which added to the zenith distance of the upper limb gives the zenith distance of the centre 38° 29′ 54″; and this taken from the latitude, leaves for the declination of the moon at the moment of observation 12h 58′ 46″.

1806, Sept. 1. ☽ UL. Zen. dist.	38° 48′ 32″.3
Error of collimation . . .	+2.9
Additional correction . . .	+1
	38 48 36.2
Refraction	45.1
	38 49 21.3
Parallax in altitude . . .	34 36.2
	38 14 45.1
Semidiameter	15 8.8
	38 29 53.9
Latitude of Greenwich . . .	51 28 40
Declination of the moon . .	12 58 46.1

Zen. dist. of ☽	38° 42′ 91″
Diminished by angle of the vertical with radius	10 3
	38 39 18=9.7956278 Log. sine

Log. of 55′ 24″=3324″ =3.5216610

Par^x. in altitude=2076′ 2″ =3.3172888

= 34′ 36″

Equatorial parallax 55′ 30″ and sem. diam. 15′ 8″.8

Diminished 6″ . 55 24=hor. par. for Greenwich.

55 24 + sine 38 39 18 =34 36=par^x in alt.

When a star whose declination is well known, and nearly on the same parallel with the moon, has been observed, it will perhaps be preferable to deduce the declination of the moon from a comparison with the star, as in the above

Example.—α Ophiuchi was observed the same day, and its

zenith distance was . . .	38° 44′ 58″.7
Refraction	44.8
Correction as in the last example .	3.9
Zen. distance corrected . . .	38 45 47.4
Zen. distance of the moon . .	38 29 54
Difference of declination between ☽ and α Ophiu.	0 15 33.4
Declination of α	12 42 57.4
Declination of the moon . . .	12 58 50.8

Declination Jan. 1800	12° 43′ 7″
Precession in six years	0 0 18.6
	12 42 48.4
Prec. Aberr. &c.	+8.8
Nut. . . .	+0.2
Declination . .	12 42 57.4

On the Method of determining the Declinations of the Stars by Means of the repeating Circle.

It has been observed under the article *Circle*, that this instrument has not yet been received into such general use in this country as on the continent, where it has almost superseded every other of the kind. With us it is but little known, though brought to the greatest perfection by one of our first artists. Perhaps we have received an unfavourable impression of it from the accounts originally transmitted to us by the French astronomers themselves, from which we were led to suppose that it was merely an ingenious contrivance to obviate the errors of a very imperfect instrument. Even in this point of view it would possess great merit; but though it certainly derives its great superiority from its property of repeating the angle; it is so far from being imperfect as an instrument for single observations, that it is equal, and perhaps superior, to any instrument of its size now in use.

If the plane of the instrument be placed in the meridian, and the level retained in a given position by means of a contrivance which Mr. Troughton has applied to some of these circles, the instrument will then very much resemble, in its principle and mode of acting, the great circle which is now constructing for the Observatory at Greenwich, and with this additional advantage that its face may be turned either to the east or west, and as the position of the circle may be changed with respect to the level, the same stars may be observed on a new set of divisions, and the four verniers are much superior in accuracy to the two microscopes which are usually applied to instruments of the other construction. The English circles which we have described are at the same time, altitude, azimuth, and transit instruments, and are so well contrived to answer these several purposes, that no sacrifice has been made in the accuracy of one operation to enable them to perform the others. The repeating circle has no such pretensions, its use as an astronomical instrument is confined to the determination of zenith distance only.

Verification of the repeating Circle.

1. To make the axis of vision of the telescope parallel to the plane of the circle.

Choose for this purpose a very distant terrestrial object, or the pole star, when at its greatest elongation from the meridian, then with the plane of the circle in a vertical position, bisect the object or star with the vertical wire, and observe what is marked by the vernier on the azimuth circle. Turn the circle exactly half round in azimuth, and the telescope half round on the circle, and if the same object is bisected, the adjustment is already perfect; if not, half the error or deviation must be rectified by the screws that act on the micrometer wires, and the other half by the tangent screw of the azimuth circle.

2. To place the plane of the circle in a true vertical position.

This adjustment is very essential when zenith distances are intended to be taken with the greatest possible precision. There is usually a mark on the small semicircle made for this purpose by the maker, the coincidence of which with a line marked on the pedestal, indicates that the plane of the vertical circle is at right angles to the azimuth circle; so that if the latter be properly adjusted, the former may be brought by this mark to its true position. This verification may likewise be accomplished by suspending a plumb line on the back of the instrument. But a much more accurate method is by means of a level properly adapted to the back of the circle. This level may be adjusted and examined in the following manner:

Select an object of considerable altitude, as a steeple or neighbouring chimney, observe some well-defined part in it, both directly and by reflection in a saucer, of oil or treacle. If the same object be intersected accurately by the vertical wire in both cases, the plane of the circle will be very exactly vertical, and the level may be then adjusted, and should be occasionally examined by the same method.

To place the horizontal wire in its proper position, so that it may be parallel to the horizon when the circle is vertical, adjust the azimuth circle, and bring the repeating circle to its vertical position; bisect some well defined horizontal

zontal object at the extremity of the wire, move the object along the field of view by means of the tangent-screw to the azimuth circle, and observe if it remain continually bisected till it arrives at the other extremity; if it does not, turn round the wires in their cell, till this verification is obtained.

Verification of the Verniers.

Call the vernier which is connected with the clamp-screw No. 1, the others No. 2, No. 3, No. 4, in succession, according to the divisions of the circle. Place No. 1. at Zero, read off all the others, and set down their deviations with the sign + or −, as they exceed or fall short of their respective divisions, add these quantities, and divide the sum by 4. This quotient may be called the index error, and must be applied to the observed angle with a contrary sign. *e. g.*

No. 1.	00″
2.	+05
3.	+10
4.	− 3
	4) +12
	+ 3″ Index error to be

subtracted from the observed angle: then suppose at the end of an observation the verniers stand thus:

No. 1.	183°	14′	10″
2.			7
3.			14
4.			20
			4) 51
	183	14	12.77
Deduct Index error			− 3
True Angle	183	14	9.77

The observer should take notice, that the circle, the level, and the front telescope, all turn round one common axis, independent of each other. Now, in observing, it must be remembered, that the circle must always be fixed to, and form one piece with one of the other two. In the front observation which begins the series, it must be considered as forming one piece with the front telescope, and care must be taken on no account to touch the screw that alters their relative position to each other. On the contrary, in the reverse observation, the circle must be considered as forming one piece with the level, and equal care taken not to separate them from their fixed position. The great danger to an unexperienced observer with this instrument is, that his whole series of observations may be destroyed by improperly releasing the piece which ought to remain fixed.

But a little consideration and practice will render this operation easy and familiar.

A well regulated clock or watch is necessary for these observations; and they will be rendered much easier, if an assistant attends to the level, while the observer bisects the star.

It may not be improper to remark, that it is of more importance to make good, than many observations. The errors of division are so small in our best constructed instruments, that a very few repetitions will render their effect quite insensible. The observer will soon find that it is the error of observation he has to contend with, arising from the smallness of the radius, and want of power in the telescope; for this reason, the observations should not be hurried, but sufficient time allowed for examining the true position of the level and the accurate bisection of the star.

The corrections to be applied to the observations made with the repeating circle arc, for the purpose of reducing the meridian altitude, from that observed a short time before or after the passage of the star over the meridian. The hour angle, or distance of the star from the meridian, must, therefore, be correctly known; and in proportion as the rate of the clock is well ascertained, may the observations be extended with confidence on each side of the meridian.

The pole-star, from the slowness of its motion, being the best adapted for observation with this instrument, we have given a table of corrections for that particular star, extending to half an hour from the meridian, beyond which the observations should never extend. This table having been calculated for the latitude of Paris some years since, the numbers must now for the latitude of Greenwich be diminished $\frac{1}{20}$th, that is, the whole correction multiplied by 0.95; and for the inferior passage of the star the whole correction must be multiplied by 0.88.

Tables II. and III. are general tables for any star, and for any latitude; they were calculated by Delambre from the following formula:

Let P = The hour angle.
L = Latitude.
D = Declination of the star.
x = Corrections required.

If the star pass southward of the zenith $x = -\frac{2\,\text{sin.}^2\frac{1}{2}P,\ \text{cos. D, cos. L}}{\text{sin. }(L-D)\ \text{sin. }1''} + \frac{1}{2}\left(\frac{2\,\text{sin.}^4\frac{1}{2}P,\ \text{cos. D, cos. L}}{\text{sin. }L-D\ \text{sin. }1''}\right)^2$ cos. L − D sin. 1″.

If the dec. be south, change the sign of D.

If the star passes to the north of the zenith, for L − D substitute D − L, and change the sign of the terms.

But if the star passes below the pole, D + L must be substituted for D − L, the signs remaining the same.

The numbers contained in these tables are the factors $\frac{2\,\text{sin.}^2\frac{1}{2}P}{\text{sin. }1''}$, and $\frac{2\,\text{sin.}^4\frac{1}{2}P}{\text{sin. }1''}$, the remainder of the calculation is thus reduced to finding the value of the other factors, $\left(\frac{\text{cos. D, cos. L}}{\text{sin. D}-L}\right) = F$, and $\left(\frac{\text{cos. D, cos. L}}{\text{sin. D}-L}\right)$ cos. D − L $= f$.

Example of an Observation of the Pole Star, by the repeating Circle. Dec. 4th, 1807.

Distance from the Meridian ′	″	Correct. by Table I. ″				
11	30	8.5				
10	20	6.9				
7	45	3.8				
6	30	2.7	147°	5′	50″	
3		0.6				
1	40	0.2				
1	30	0.2				
4	20	1.2	294	11	00	
7		3.2				
8	40	4.8	70	43	58	
12		9.3				
16	30	17.5	81	16	54	= 1st Vernier.
					50	= 2d
Sum		58.9			58	= 3d
					60	= 4th

58.9

58 9 = Sum of the corrections
2.9 = $\frac{1}{20}$th

12)56″.0 cor. diminifhed $\frac{1}{20}$th.

4.7 divided by the number of obfervations.

At the end of 12 obfervations the inftrument gave - -	81°	16′	55″.5
Index error - -			3.3
	81	16	58.8
	360		
	12)441	16	58.8
	36	46	24.9
Correction - - -			4.7
	36	46	20.2
The firft four obfervations give	36	46	22.2
eight - -	36	46	19 6
ten - -	36	46	21.0
twelve - -	36	46	20.2

Example of the Ufe of the general Tables.

Hour Angle.	Tab. II.	Tab. III.	
11 30	259.6	0.163	D = 88° 17′
10 20	209.6	0.107	L = 51 30.20
7 45	117.9	0.033	
6 30	83.0	0.016	
3 0	17.7	0.001	
1 40	5.4	0.000	
1 30	4.4	0 000	
4 20	36 9	0.003	
7 0	96.2	0.022	
8 40	147.5	0.053	
12 0	280.7	0.194	
16 30	534 4	0.700	
	1793.3	1.292	

$$F = \frac{\text{cof. D, cof. L}}{\text{fin. D} - \text{L}} \quad f = \left(\frac{\text{cof. D, cof. L}}{\text{fin. D} - \text{L}}\right)^2 \text{cof. D} - \text{L}.$$

Log. 1793.3 = 3.25358	Log. 1.292 = 0.11126
Co. log. 12. = 8.92082	Co. log. 12 = 8.92082
Log. F = 8.49337	Log. f = 7.11313
+ 4.″65 = 0.66777	6.14521

Tab. II. +4.″65
III. −0.″00

+4.″65 = correction.—The fame very nearly as in the preceding example.

Dr. BRADLEY's CATALOGUE OF FIXED STARS

THOSE ſtars whoſe right aſcenſion is between 90° and 270° with north declination, and more than 270° and leſs than 90° with ſouth declination, have their annual variation of declination *ſubtractive;* and thoſe ſtars whoſe right aſcenſion is more than 270° and leſs than 90° with north declination, and between 90° and 270° with ſouth declination, have their annual variation of declination *additive.* This is to be underſtood with reſpect to a time *after* January 1, 1760; but, if the time *precede* that period, the variation of declination is to be applied with a *contrary* ſign.

Numb. of Stars.	Names of the Stars.	Magnitude.	Mean Right Aſcenſion, Jan. 1, 1760.			An. Preceſ. in Right Aſcenſion,		Mean diſtance from N. Pole, Jan. 1, 1760.			An. Preceſ. in Declination,	
						1760.	1800.				1760.	1800.
			D.	M.	S.	S.	S.	D.	M.	S.	S.	S.
1	γ Pegaſi	2	0	13	35.1	45.95	45.99	76	9	5.3	20.01	20.01
2	ι Ceti	3	1	47	59.9	45.80	45.79	100	9	20.8	20.00	19.99
3	d Piſcium	5	2	4	1.0	46.01	46.04	83	8	39.7	20.00	19.99
4	δ Andromedæ	3	6	38	13.7	47.24	47.36	60	27	20.0	19.88	19.85
5	α Caſſiopeiæ	3	6	45	35.0	49.32	49.63	34	46	53.5	19.87	19.85
6	β Ceti	3	7	52	59.0	44.97	44.92	109	18	27.1	19.82	19.80
7	ζ Andromedæ	4	8	39	58.0	47.20	47.30	67	2	30.5	19.78	19.75
8	20 Ceti	5	10	11	19.0	45.78	45.78	92	27	8.0	19.70	19.66
9	γ Caſſiopeiæ	3	10	36	19.0	52.16	52.55	30	35	16.2	19.67	19.63
10	ε Piſcium	4	12	37	43.0	46.43	46.47	83	24	26.6	19.53	19.48
11	e Piſcium	5	14	0	30.0	46.30	46.33	85	37	30.8	19.42	19.37
12	β Andromedæ	2	14	6	29.2	49.26	49.41	55	39	32.6	19.41	19.36
13	η Ceti	3	14	7	48.0	44.94	44.92	101	27	39.4	19.41	19.36
14	θ Caſſiopeiæ	4	14	9	48.0	52.65	52.95	36	7	56.0	19.40	19.35
15	ζ Piſcium	4	15	18	18.0	46.52	46.55	83	42	0.3	19.30	19.25
16	δ Caſſiopeiæ	3	17	34	49.0	55.98	56.41	31	1	9.5	19.08	19.01
17	θ Ceti	3	18	0	33.0	44.90	44.90	99	25	40.6	19.03	18.97
18	μ Piſcium	5	19	24	35.0	46.50	46.54	85	6	0.5	18.88	18.81
19	η Piſcium	5	19	40	14.0	47.62	47.69	75	53	55.0	18.85	18.78
20	π Piſcium	5	21	6	13.0	47.32	47.38	79	5	39.7	18.67	18.60
21	105 Piſcium	5	21	41	38.0	47.93	48.02	74	49	11.7	18.60	18.52
22	ν Piſcium	4	22	14	26.0	46.49	46.53	85	44	7.3	18.52	18.45
23	ο Piſcium	4	23	11	14.0	47.03	47.08	82	3	31.8	18.40	18.32
24	ε Caſſiopeiæ	3	24	21	0.0	61.76	62.32	27	31	26.8	18.23	18.13
25	γ Arietis	4	25	6	4.8	48.70	48.79	71	53	33.0	18.12	18.04
26	β Arietis	3	25	21	26.1	48.98	49.09	70	22	29.8	18.09	18.00
27	ι Arietis	5	26	4	13.5	48.56	48.64	73	21	50.6	17.98	17.89
28	λ Arietis	5	26	9	8.6	49.57	49.68	67	35	4.0	17.96	17.87
29	γ Andromedæ	2	27	19	7.0	53.96	54.18	48	50	2.0	17.78	17.68
30	α Piſcium	3	27	24	46.0	46.18	46.23	88	24	18.4	17.77	17.68
31	α Arietis	2	28	25	26.6	49.84	49.95	67	41	1.4	17.60	17.50
32	19 Arietis	5	30	0	8.0	48.46	48.53	75	51	23.8	17.33	17.23
33	1 ξ Ceti	5	30	4	35.0	47.30	47.34	82	17	23.2	17.32	17.22
34	1 θ Arietis	5	31	12	18.0	49.45	49.55	71	13	17.9	17.12	17.01
35	ο Ceti, var.	2	31	48	41.0	45.18	45.20	94	4	44.7	17.01	16.91
36	2 ξ Ceti	4	33	51	24.0	47.37	47.43	82	37	41.0	16.62	16.51
37	δ Ceti	3	36	47	59.5	45.78	45.81	90	43	9.3	16.03	15.91
38	θ Perſei	4	36	58	56.0	59.39	59.68	41	48	13.4	15.99	15.84
39	ε Ceti	3	36	59	31.0	43.17	43.18	102	54	9.5	15.99	15.88
40	35 Arietis	4	37	21	28.0	52.03	52.16	63	19	43.2	15.91	15.78

Dr. BRADLEY's CATALOGUE OF FIXED STARS.

Numb. of Stars.	Names of the Stars.	Magnitude.	Mean Right Afcenfion, Jan. 1, 1760.			An. Precef. in Right Afcenfion,		Mean Diftance from N. Pole, Jan. 1, 1760.			An. Precef. in Declination,	
						1760.	1800.				1760.	1800.
			D.	M.	S.	S.	S.	D.	M.	S.	S.	S.
41	γ Ceti	3	37	43	27 0	46.40	46.45	87	47	18.4	15 83	15.72
42	μ Ceti	4	38	0	6.0	47.90	47.96	80	54	46.8	15.77	15.65
43	π Ceti	3	38	10	39.0	42.64	42.65	104	53	14.5	15.73	15 63
44	τ Perfei	5	30	20	51.0	62.03	62.37	38	14	18.4	15.48	15.32
45	3 ϱ Arietis	5	40	43	55.0	49.93	50.02	72	56	57.0	15.17	15.03
46	η Eridani	3	41	10	45.0	43.64	43.66	99	51	58.0	15.06	14.95
47	ε Arietis	5	41	23	0.2	50.84	50 94	69	38	5.5	15.02	14.88
48	γ Perfei	3	41	53	38.0	63.36	63.71	37	28	13 7	14.90	14.73
49	α Ceti	2	42	26	24.1	46.67	46.72	86	51	59 8	14.77	14.64
50	β Perfei	3	43	9	52.0	57.42	57.62	49	59	15.8	14.60	14.44
51	δ Arietis	4	44	29	11.0	50.70	50.80	71	11	53.5	14.28	14.14
52	ζ Arietis	5	45	17	19 0	51.14	51.24	69	51	40.2	14.08	13.93
53	12 Eridani	3	45	28	7.0	37.73	37.70	119	56	51.6	14 04	13.93
54	ζ Eridani	3	46	2	54.0	43.46	43.48	99	43	32.8	13.89	13.77
55	α Perfei	2	46	49	50.0	62.71	62.99	41	0	50.9	13.69	13.51
56	2 τ Arietis	5	47	14	48.0	51.24	51.33	70	8	2.3	13.59	13.44
57	f Tauri	4	49	24	48.3	49.19	49.26	77	54	10.6	13.01	12.87
58	17 Eridani	4,5	49	41	48.0	44 35	44.38	95	54	46.8	12 95	12.81
59	δ Perfei	3	51	29	11.0	62.78	62.97	43	0	9.8	12.46	12.26
60	b Pleiadum	5	52	40	7.0	52.79	52.89	66	39	38.0	12.14	11.97
61	e Pleiadum	5	52	44	32 0	52.92	53.02	66	18	16.2	12.12	11.95
62	δ Eridani	3,4	52	56	33.0	42.94	42 96	100	35	32.4	12.06	11.92
63	d Pleiadum	5	53	2	1.0	52.77	52.87	66	49	6.5	12.03	11.87
64	η Tauri	3	53	18	55 2	52 85	52.95	66	39	22.1	11.96	11.79
65	γ Eridani	2	56	42	35.0	41.69	41.71	104	12	26.5	10.98	10 85
66	1 λ Perfei	4	57	12	6.0	67.75	65 99	40	19	28 9	10.84	10.62
67	A Tauri	4	57	38	1.0	52.55	52.64	68	35	37.4	10.71	10.54
68	φ Tauri	5	61	24	32.0	54.79	54.88	63	14	45.8	9.58	9.39
69	γ Tauri	3	61	32	26.2	50.65	50.71	74	58	20.8	9.54	9 34
70	χ Tauri	5	62	0	16.0	54.18	54.27	64	57	30.8	9.39	9.21
71	1 δ Tauri	4	62	16	57.0	51.32	51.39	73	2	28.6	9.31	9.13
72	2 δ Tauri	4.	62	34	25.0	51.31	51 38	73	7	56.9	9.22	9.04
73	1 κ Tauri	5	62	46	34 0	53.02	53.09	68	16	36.0	9.16	8.97
74	2 κ Tauri	4	62	47	18.0	52.98	53.06	68	22	13.5	9 15	8.97
75	3 δ Tauri	5	62	54	33.0	51.50	51.56	72	38	31.5	9.11	8.93
76	1 υ Tauri	5	62	59	43.0	53.22	53 30	67	45	7.8	9.09	8.90
77	ε Tauri	2	63	39	28.5	51.97	52.04	71	22	25.3	8.88	8.70
78	1 θ Tauri	5	63	43	22.0	50.87	50.92	74	35	29.5	8 86	8.68
79	2 θ Tauri	5	63	44	47.0	50.84	50.90	74	40	59.0	8.85	8.67
80	Aldebaran	1	65	32	38.7	51.15	51.21	73	59	39.7	8.29	8.10
81	τ Tauri	5	66	58	5.0	53.55	53.61	67	31	33 3	7.83	7 64
82	1 π Orionis	4	69	23	16.0	48.72	48.75	81	31	55.1	7.05	6.87
83	7 Camelopard.	5	69	31	48.0	71.12	71.31	36	39	46.3	7.00	6.74
84	ι Tauri	4	72	11	37.7	55.33	53.38	68	46	31.5	6.11	5.91
85	m Tauri	5	73	19	12.0	52.27	52.31	71	42	1.2	5.74	5.55
86	105 Tauri	5	73	23	58.0	53.43	53.65	68	38	12.2	5.72	5.52
87	h Eridani	3	74	1	5.0	44.10	44.12	95	24	56.9	5.51	5.34
88	Capella	1	74	44	59.5	65.73	65.84	44	16	27.5	5.26	5.02
89	Rigel	1	75	45	10.9	43.03	43.05	98	29	50.7	4.93	4.76
90	β Tauri	2	77	47	7.0	56.49	56.54	61	37	12.0	4.23	4.02

Dr. BRADLEY's CATALOGUE OF FIXED STARS.

Numb. of Stars.	Names of the Stars.	Magnitude.	Mean Right Ascension, Jan. 1, 1760.			An. Precef. in Right Ascenſion,		Mean diſtance from N. Pole, Jan. 1. 1760.			An. Precef. in Declination,	
						1760.	1800.				1760.	1800.
			D.	M.	S.	S.	S.	D.	M.	S.	S.	S.
91	γ Orionis	2	78	4	8.0	48.02	48.05	83	53	20.7	4.14	3.95
92	o Tauri	5	78	18	35.0	53.73	53.86	68	17	30.7	4.06	3.85
93	2 ψ Orionis	5	78	34	9.0	46.91	46.93	87	7	59.5	3.97	3.79
94	β Leporis	3	79	29	40.0	38.39	38.40	110	58	4.3	3.65	3.50
95	δ Orionis	2	79	56	22.0	45.76	45.77	90	29	50.1	3.50	3.32
96	α Leporis	3	80	32	21.0	39.51	39.52	108	0	43.0	3.29	3.14
97	ζ Tauri	3	80	49	41.8	53.50	53.53	69	1	37.4	3.19	2.98
98	ε Orionis	2	81	0	41.0	45.45	45.47	91	22	33.3	3.13	2.95
99	125 Tauri	5	81	13	4.0	55.46	55.51	64	15	44.3	3.06	2.84
100	132 Tauri	4	83	34	30.0	54.97	55.00	65	32	17.3	2.24	2.03
101	γ Leporis	3	83	37	3.0	37.67	37.68	112	32	47.0	2.22	2.08
102	136 Tauri	5	84	33	46.0	56.31	56.33	62	28	9.0	1.90	1.68
103	δ Aurigæ	4	84	46	44.3	73.60	73.65	35	45	53.2	1.82	1.54
104	1 χ Orionis	5	85	2	44.0	53.27	53.28	69	47	29.5	1.73	1.52
105	2 χ Orionis	5	85	11	7.0	53.06	53.07	70	19	42.7	1.68	1.47
106	α Orionis	1	85	32	47.2	48.50	48.51	82	39	34.5	1.55	1.37
107	θ Aurigæ	4	85	50	21.0	61.06	61.11	52	49	51.6	1.45	1.21
108	H Geminorum	5	87	23	1.0	54.52	54.53	66	44	51.9	0.91	0.70
109	κ Aurigæ	5	90	1	18.0	57.28	57.28	60	26	18.9	0.01	0.23
110	η Geminorum	4	90	5	52.8	54.24	54.24	67	26	51.7	0.03	0.25
111	μ Geminorum	3	92	6	34.1	54.26	54.25	67	23	13.3	0.74	0.95
112	ν Geminorum	4	93	40	39.7	53.34	53.32	69	39	34.6	1.28	1.49
113	23 Geminorum	5	95	32	4.0	52.08	52.06	—	—	—	1.93	2.13
114	γ Geminorum	2	95	57	37.3	51.85	51.84	73	25	8.4	2.08	2.28
115	26 Geminorum	5	97	6	20.0	52.33	52.31	72	8	33.2	2.48	2.68
116	ε Geminorum	3	97	17	20.7	55.33	55.30	64	39	19.7	2.54	2.75
117	28 Geminorum	5	97	23	5.0	57.04	56.99	60	48	41.5	2.57	2.79
118	Sirius	1	98	38	36.8	40.10	40.10	106	24	6.3	3.01	3.16
119	ζ Geminorum	4	102	27	57.0	53.39	53.35	69	6	2.1	4.32	4.52
120	51 Geminorum	5	104	53	40.0	51.67	51.70	73	27	21.8	5.14	5.34
121	19 Lyncis	5	105	48	8.0	74.16	73.97	34	17	49.0	5.45	5.73
122	λ Geminorum	5	106	4	22.0	51.78	51.75	73	2	54.7	5.54	5.73
123	δ Geminorum	3	106	26	38.0	53.84	53.79	67	35	53.7	5.67	5.86
124	q Geminorum	5	106	56	31.0	53.23	53.20	69	7	33.8	5.83	6.03
125	ι Geminorum	5	107	42	2.0	56.17	56.11	61	44	54.5	6.08	6.29
126	p Geminorum	5	108	22	8.0	53.57	53.51	68	5	12.0	6.31	6.50
127	η Canis major	2	108	39	8.0	35.48	35.48	118	30	57.0	6.40	6.53
128	Caſtor	1	109	48	45.7	57.87	57.39	57	36	36.0	6.78	6.99
129	υ Geminorum	4	110	16	34.1	55.66	55.59	62	35	36.0	6.94	7.14
130	f Geminorum	5	111	24	2.0	52.05	52.00	71	48	1.0	7.30	7.47
131	Procyon	1	111	40	56.8	47.82	47.79	84	10	36.0	7.39	7.56
132	κ Geminorum	5	112	28	59.0	54.53	54.47	65	2	54.0	7.65	7.85
133	Pollux	1	112	39	3.7	55.99	55.91	61	24	56.8	7.71	7.90
134	g Geminorum	5	113	3	12.0	52.30	52.24	70	55	32.2	7.84	8.02
135	26 Lyncis	5	114	17	24.0	66.30	66.11	41	50	18.1	8.29	8.47
136	φ Geminorum	5	114	41	34.0	55.33	55.25	62	38	6.1	8.36	8.55
137	3 Cancri	5	116	57	4.0	52.03	51.96	71	7	2.8	9.07	9.25
138	μ Cancri	5	118	0	54.0	53.54	53.46	66	41	57.2	9.40	9.58
139	2 ψ Cancri	4	118	59	26.0	54.55	54.46	63	46	59.2	9.70	9.88
140	β Cancri	3	120	52	13.0	48.93	48.88	80	5	35.0	10.27	10.43

DECLINATION.

Dr. BRADLEY's CATALOGUE OF FIXED STARS.

Numb. of Stars.	Names of the Stars.	Magnitude.	Mean Right Afcenfion, Jan. 1, 1760.	An. Precef. in Right Afcenfion, 1760.	1800.	Mean Diftance from N. Pole, Jan. 1, 1760.	An. Precef. in Declination, 1760.	1800.
			D. M. S.	S.	S.	D. M. S.	S.	S.
141	θ Cancri	5	124 28 16.0	51.57	51.49	71 6 44.5	11.33	11.49
142	η Cancri	5	124 41 53 0	52.32	52.24	68 45 40.5	11.39	11.56
143	γ Cancri	4	127 20 30.0	52.46	52.36	67 41 9.1	12.14	12.30
144	δ Cancri	4	127 45 17.0	51.38	48.30	70 58 47.9	12.25	12 41
145	ι Urfæ major	4	130 40 2.0	63.37	63.09	41 2 3.1	13.04	13.23
146	1 α Cancri	4	130 41 58 3	49 30	49.23	77 28 22.1	13.05	13.19
147	2 α Cancri	4	131 20 4.8	49.33	49.37	77 13 43.7	13.22	13.36
148	κ Cancri	5	133 40 53.0	48.90	48 84	78 22 52.5	13 88	14.02
149	ξ Cancri	6	133 52 48.5	52.06	51.95	66 59 57.6	13 87	14.01
150	ω Leonis	5	138 53 50.0	48.27	48.21	79 54 42.5	15 08	15.20
151	α Hydræ	2	138 56 57.0	44.17	44.15	97 37 48.0	15.09	15.20
152	θ Urfæ major	3,4	139 10 9.0	63.14	62.79	37 14 35 0	15.14	15 30
153	ξ Leonis	4	139 44 49.0	48.81	48.69	77 39 4.3	15.27	15.39
154	10 Leon minor	4,5	139 51 36.6	55.82	55.63	52 33 6 3	15.30	15.44
155	10 Leonis	5	141 7 58.9	47.67	47.61	82 5 58.5	15.58	15 69
156	ο Leonis	4	142 4 50.0	48.31	48.25	79 1 40.8	15.79	15.90
157	ε Leonis	3	143 2 44.0	51.50	51.39	65 7 59.5	15.99	16.11
158	ν Leonis	5	146 19 20.0	48.61	48.53	76 25 16.5	16.65	16.76
159	π Leonis	4	146 52 44.0	47.70	47.64	80 48 51 7	16.76	16.86
160	η Leonis	4	148 33 18.0	49.30	49.22	72 4 37.5	17.07	17.17
161	A Leonis	5	148 47 16.0	47.97	47.91	78 50 10.9	17.12	17.21
162	Regulus	1	148 53 32.5	48.34	48.27	76 52 9.1	17.14	17.23
163	ζ Leonis	3	150 49 28.0	50.39	50.28	65 23 47.8	17.47	17.56
164	γ Leonis	2	151 40 35.0	49.58	49.48	68 57 13.1	17.62	17.70
165	μ Urfæ major	3	151 59 9.0	54.60	54.37	47 18 10.5	17.67	17.76
166	ρ Leonis	4	155 2 25.0	47.50	47.44	79 27 56.6	18.14	18 19
167	48 Leonis	5	155 34 0.0	47.12	47.06	81 49 5.0	18.22	18.29
168	37 Sextantis	6	158 23 42.0	46 91	46.87	82 22 6.4	18.61	18.67
169	38 Sextantis	6	158 42 21.0	46.90	46.85	82 23 40.1	18.65	18.71
170	55 Leonis	5	160 50 19.0	46.16	46.13	87 59 20.5	18.90	18.96
171	56 Leonis	6	160 53 17.0	46.79	46.74	82 32 24.0	18.91	18.96
172	β Urfæ major	2	161 47 56.0	55.80	55.40	32 20 13 9	19.01	19.07
173	d Leonis	5	162 2 29.0	46.46	46.42	85 5 55.0	19.04	19.09
174	c Leonis	5	162 4 30.0	46.73	46.68	82 36 53.1	19.04	19.09
175	α Urfæ major	1,2	162 10 35.0	57.97	57 45	26 57 33.2	19.05	19.12
176	χ Leonis	5	163 9 26.0	46.81	46.76	81 22 16.7	19.15	19.20
177	δ Leonis	3	165 19 38.0	47.96	47.87	68 9 53.3	19.36	19.40
178	θ Leonis	3	165 24 23.0	47.44	47.37	73 15 46.5	19.37	19.41
179	75 Leonis	5	166 14 1.0	46.20	46.18	86 40 21.8	19.44	19.48
180	76 Leonis	5	166 38 57.0	46.17	46.14	87 2 15.5	19.47	19.51
181	σ Leonis	5	167 11 17.0	46.50	46.46	82 39 30.3	19.52	19.55
182	79 Leonis	5,6	167 55 51.0	46.13	46.10	87 16 40.1	19.57	19.60
183	τ Leonis	4	168 53 51.0	46.21	46.18	85 49 27.5	19.64	19 67
184	e Leonis	5	169 30 53.0	45.82	45.80	91 40 54.8	19.68	19.71
185	υ Leonis	4	171 9 57.0	45.95	45.94	89 30 1.6	19.78	19.80
186	1 ξ Virginis	5	173 13 35.0	46.33	46.29	80 24 33.8	19.87	19.89
187	ν Virginis	5	173 22 41.0	46.25	46.21	82 7 35.0	19.88	19.89
188	β Leonis	1,2	174 11 59.0	46.50	46.45	74 5 13.0	19.91	19.92
189	β Virginis	3	174 32 51.3	46.03	46.02	86 52 56.1	19.92	19.93
190	γ Urfæ major	2	175 16 25.0	48.29	48.00	34 58 16.1	19.95	19.96

Dr. BRADLEY's CATALOGUE OF FIXED STARS.

Numb. of Stars.	Names of the Stars.	Magnitude.	Mean Right Aſcenſion, Jan. 1, 1760.	An. Preceſ. in Right Aſcenſion, 1760.	An. Preceſ. in Right Aſcenſion, 1800.	Mean Diſtance from N. Pole, Jan. 1, 1760,	An. Preceſ. in Declination, 1760.	An. Preceſ. in Declination, 1800.
			D. M. S.	S.	S.	D. M. S.	S.	S.
191	π Virginis	5	177 8 28.0	46.07	46.04	82 2 50.3	19.99	19.99
192	δ Urſæ major	3	180 51 27.0	45.44	45.16	31 37 54.1	20.01	20.00
193	γ Corvi	3	180 52 30.0	46.01	46.07	106 12 27.1	20.01	20.00
194	n Virginis	5	181 35 43.0	45.93	45.93	89 27 1.3	20.01	20.00
195	η Virginis	3	181 54 30.7	45.94	45.95	89 19 51.9	20.00	19.99
196	c Virginis	3	182 2 32.0	45.87	45.86	85 20 55.7	20.00	19.99
197	κ Draconis	3	185 46 32.0	40.04	39.67	18 53 2.6	19.91	19.89
198	χ Virginis	5	186 43 19.0	46.21	46.23	96 40 13.5	19.88	19.85
199	γ Virginis	3	187 22 45.9	45.93	45.95	90 7 43.5	19.85	19.82
200	ψ Virginis	5	190 28 32.0	46.45	46.50	98 13 47.8	19.68	19.64
201	δ Virginis	3	190 52 54.0	45.62	45.62	85 17 32.5	19.65	19.61
202	ε Virginis	3	192 33 31.0	44.98	44.97	77 44 43.5	19.53	19.49
203	g Virginis	5	193 50 21.0	46.72	46.77	99 27 0.8	19.43	19.38
204	θ Virginis	4	194 23 16.0	46.30	46.33	94 15 3.2	19.39	19.34
205	Spica Virginis	1	198 8 44.1	47.01	47.07	99 54 3.0	19.02	18.96
206	ι Virginis	4	198 31 4.0	47.22	47.27	101 27 1.4	18.98	18.91
207	ζ Urſæ major	3	198 33 12.0	36.42	36.30	33 48 53.7	18.97	18.92
208	2 l Virginis	5	199 52 44.0	46.52	46.57	95 0 28.8	18.82	18.75
209	m Virginis	5	202 15 44.0	46.92	46.98	97 28 57.5	18.52	18.45
210	η Urſæ major	2	204 31 1.0	35.85	35.77	39 28 51.7	18.21	18.15
211	α Draconis	2	209 28 38.0	24.29	24.31	24 28 18.2	17.42	17.33
212	κ Virginis	4	210 1 50.0	47.54	47.60	99 8 41.8	17.33	17.23
213	Arcturus	1	211 10 53.0	42.07	42.06	69 33 27.1	17.12	17.04
214	λ Virginis	4	211 32 26.0	48.20	48.27	102 15 12.3	17.06	16.95
215	θ Bootis	4	214 15 32.0	30.99	30.97	37 1 48.3	16.54	16.51
216	μ Libræ	5	219 3 4.0	48.87	48.95	103 8 2.5	15.54	15.42
217	α Libræ	2	219 24 40.6	49.35	49.42	105 1 44.5	15.46	15.35
218	2 ξ Libræ	5	220 56 46.0	48.34	48.41	100 25 30.5	15.12	14.99
219	18 Libræ	5	221 29 16.0	48.30	48.37	100 9 47.5	14.99	14.86
220	β Urſæ minor	3	222 55 17.0	−5.43	−4.78	14 51 44.5	14.66	14.67
221	1 ν Libræ	5	223 19 19.0	49.69	49.76	105 18 33.5	14.56	14.46
222	1 ι Libræ	3	224 38 51.0	50.73	50.83	108 51 58.7	14.24	14.10
223	β Libræ	2	226 1 57.5	48.08	48.14	98 28 51.5	13.89	13.76
224	4 ζ Libræ	4	229 50 59.8	50.32	50.40	106 1 11.9	12.90	12.75
225	γ Libræ	3.4	230 32 1 7	49.77	49.84	103 58 14.2	12.72	12.57
226	α Coron. Bor.	2	231 8 6.0	37.80	37.81	62 27 48.0	12.56	12.44
227	42 Libræ	5	231 32 12.0	52.58	52.68	113 1 3.0	12.45	12.29
228	κ Libræ	4	232 2 34 0	51.32	51.41	108 52 50.6	12.31	12.15
229	α Sepentis	2	233 7 0.0	43.91	43.93	82 48 11.2	12.01	11.87
230	1 A Scorpii	5	234 48 51.0	53.41	53.54	114 35 22.5	11.53	11.36
231	λ Libræ	4	234 51 40.0	51.70	51.78	109 25 48.8	11.52	11.35
232	ϑ Libræ	4	235 2 58.0	50.63	50.71	106 0 18.1	11.47	11.30
233	ρ Serpentis	3	235 11 3.0	39.38	39.40	68 17 9.4	11.43	11.30
234	π Scorpii	3	236 5 47.0	53.81	53.91	115 23 41.2	11.16	10.99
235	ψ Libræ	4	236 11 53.0	49.94	50.01	103 34 0.4	11.13	10.97
236	δ Scorpii	3	236 32 44.0	52.65	52.73	111 55 1.7	11.03	10.86
237	β Scorpii	2	237 52 47.0	51.81	51.88	109 7 39.1	10.64	10.47
238	1 ω Scorpii	5	238 12 9.0	52.13	52.20	109 59 53.2	10.55	10.37
239	2 ω Scorpii	5	238 20 37 0	52.20	52.27	110 11 57.8	10.50	10.33
240	ι Hercules	5	238 50 11 0	27.75	27.77	43 17 29 0	10.36	10.26

Dr. BRADLEY's CATALOGUE OF FIXED STARS.

Numb. of Stars.	Names of the Stars.	Magnitude.	Mean Right Ascension, Jan. 1, 1760.	An. Precess. in Right Ascension, 1760.	An. Precess. in Right Ascension, 1800.	Mean Distance from N. Pole, Jan. 1, 1760.	An. Precess. in Declination, 1760.	An. Precess. in Declination, 1800.
			D. M. S.	S.	S.	D. M. S.	S.	S.
241	ν Scorpii	4	239 31 18.0	51.80	51.88	108 48 58.2	10.15	9.98
242	δ Ophiuchi	3	240 26 54.0	46.86	46.90	93 3 26.9	9.87	9.71
243	19 Scorpii	5	241 33 35.0	53.60	53.69	113 34 2.5	9.53	9.34
244	σ Scorpii	4	241 39 40.0	54.14	54.21	114 59 41.1	9.50	9.31
245	ψ Ophiuchi	5	242 31 27.0	52.20	52.27	109 27 16.5	9.23	9.05
246	g Ophiuchi	5	242 48 34.0	53.44	53.51	112 52 18.5	9.15	8.96
247	Antares	1	243 41 0.9	54.63	54.71	115 52 32.5	8.87	8.68
248	φ Ophiuchi	4	244 21 24.0	51.12	51.18	106 4 2.5	8.66	8.48
249	ω Ophiuchi	5	244 29 14.0	52.84	52.90	110 55 51.0	8.62	8.43
250	τ Scorpii	4	245 14 48.0	55.47	55.55	117 41 41.9	8.38	8.18
251	24 Scorpii	5	246 55 47.0	51.65	51.71	107 15 14.4	7.84	7.65
252	μ Draconis	4	255 5 46.3	18.51	18.56	35 12 23.0	5.15	5.08
253	A Ophiuchi dup.	5	255 9 24.0	55.46	55.51	116 13 22.5	5.12	4.92
254	α Herculis	3	255 55 45.0	40.85	40.85	75 19 5.5	4.87	4.71
255	ρ Ophiuchi	4	256 39 35.0	53.40	53.37	110 49 49.6	4.62	4.41
256	θ Ophiuchi	3	256 49 28.0	54.90	54.95	114 44 1.9	4.56	4.34
257	43 Ophiuchi	5	257 4 19.0	56.25	56.30	117 53 1.5	4.48	4.26
258	B Ophiuchi	4	257 56 4.0	54.61	54.65	113 55 44.3	4.18	3.97
259	e Ophiuchi	5	259 11 56.0	54.58	54.58	113 45 7.5	3.75	3.54
260	α Ophiuchi	2	260 57 4.0	41.45	41.46	77 14 48.9	3.14	2.99
261	μ Ophiuchi	4	261 12 13.0	48.69	48.71	97 57 5.9	3.06	2.87
262	β Draconis	3	261 15 28.0	20.16	20.18	37 30 41.2	3.04	2.96
263	D Ophiuchi	5	262 15 59.0	53.76	53.78	111 32 29.8	2.69	2.48
264	p Sagittarii	3	263 7 5.0	56.36	56.38	117 42 45.1	2.40	2.18
265	b Sagittarii	5	266 17 18.0	54.72	54.79	113 46 5 5	1.30	1.08
266	γ Sagittarii	3,4	267 36 0.0	57.66	57.67	120 23 56.4	0.84	0.61
267	γ Draconis	2	267 45 50.0	20.76	20.76	38 28 23.6	0.78	0.70
268	1 μ Sagittarii	4	269 51 11.9	53.65	53.63	111 5 47.7	0.05	0.16
269	2 μ Sagittarii	4	270 13 34.0	53.52	53.52	110 46 28.4	0.08	0.29
270	δ Sagittarii	3	271 24 26.8	57.43	57.43	119 54 11.5	0.49	0.72
271	ε Sagittarii	2	272 3 44.0	59.66	59.65	124 28 12.1	0.72	0.95
272	λ Sagittarii	4	273 17 32.0	55.47	55.47	115 31 40.8	1.15	1.36
273	α Lyræ	1	277 12 11.0	30.09	30.06	51 25 33.7	2.51	2.63
274	φ Sagittarii	3	277 39 49.0	56.13	56.10	117 12 39.3	2.67	2.88
275	28 Sagittarii	5	277 57 59.0	54.19	54.16	112 37 4.5	2.77	2.98
276	c Draconis	5	279 29 44.0	17.42	17.40	34 41 45.7	3.30	3.37
277	1 ν Sagittarii	4	279 55 9.0	54.30	54.08	113 0 56.2	3.33	3.66
278	σ Sagittarii	3	280 5 40.0	55.78	55.74	116 34 7.3	3.51	3.72
279	2 ν Sagittarii	4	280 8 59.0	54.27	54.24	112 56 47.1	3.53	3.73
280	β Lyræ	3	280 18 26.0	33.09	53.09	56 53 47.8	3.58	3.71
281	1 ξ Sagittarii	6	280 46 8.0	53.45	53.42	110 56 44.3	3.74	3.94
282	2 ξ Sagittarii	5	280 51 5.0	55.63	53.60	111 23 51.8	3.77	3.97
283	1 θ Serpentis }	3	281 4 20.9	44.59	44.58	86 5 29.3	3.84	4.01
284	2 θ Serpentis }		281 4 39.6	44.59	44.58	86 5 23.3	3.85	4.02
285	ζ Sagittarii	4	281 49 59.0	57.33	57.28	120 11 49.6	4.10	4.32
286	o Draconis	4	281 54 46.0	13.21	13.25	30 53 55.4	4.13	4.18
287	ο Sagittarii	3	282 34 26.0	53.85	53.81	112 4 8.9	4.36	4.56
288	τ Sagittarii	3	282 59 9.0	56.29	56.25	117 59 42.4	4.50	4.72
289	ζ Aquilæ	3	283 35 50.0	41.25	41.24	76 28 32.0	4.71	4.86
290	π Sagittarii	4	283 52 14.0	53.53	53.49	111 22 52.7	4.80	5.00

DR. BRADLEY's CATALOGUE OF FIXED STARS.

Numb. of Stars.	Names of the Stars.	Magnitude.	Mean Right Afcenfion, Jan. 1, 1760.	An. Precef. in Right Afcenfion, 1760.	1800.	Mean diftance from N. Pole, Jan. 1. 1760.	An. Precef. in Declination, 1760	1800.
			D. M. S.	S.	S.	D. M. S.	S.	S.
291	ψ Sagittarii - - - -	4	285 12 11.0	55.20	55.15	115 38 42.5	5.25	5.45
292	d Sagittarii - - - -	4	285 53 43.0	52.69	52.65	109 21 26.0	5.48	5.73
293	1 χ Sagittarii - - -	5	287 39 48.0	54.80	54.74	114 57 6.5	6.07	6.27
294	κ Cygni - - - - -	4	287 53 20.0	20.71	20.69	37 3 57.0	6.15	6.22
295	δ Draconis - - - - -	3	288 6 35.0	0.59	0.45	22 45 34.5	6.22	6.22
296	δ Aquilæ - - - - -	3	288 20 56.0	45.05	45.03	87 20 44.3	6.30	6.46
297	2 h Sagittarii - - - -	5	290 31 10.0	54.82	54.76	115 23 28.6	7.02	7.21
298	ι Cygni - - - - -	4	290 54 49.0	22.65	22.63	38 46 21.0	7.14	7.23
299	θ Cygni - - - - -	4	292 30 0.0	24.15	24.13	40 19 30.3	7.66	7.74
300	f Sagittarii - - - - -	5	293 5 6.0	52.74	52.68	110 19 2.0	7.85	8.03
301	γ Aquilæ - - - - -	3	293 42 45.3	42.68	42.67	79 57 16.6	8.05	8.20
302	δ Cygni - - - - -	3	294 22 9.0	27.98	27.97	45 26 39.1	8.26	8.35
303	α Aquilæ - - - - -	1	294 46 0.7	43.29	43.28	81 44 51.1	8.38	8.54
304	ω Sagittarii - - - - -	5	295 16 31.0	55.11	55.03	116 54 49.0	8.55	8.74
305	b Sagittarii - - - - -	4	295 32 52.0	55.44	55.35	117 46 58.8	8.63	8.82
306	β Aquilæ - - - - -	3	295 52 51.5	44.09	44.07	84 10 28.3	8.74	8.89
307	a Sagittarii - - - - -	5	296 4 34.0	55.02	54.93	116 49 19.9	8.80	8.99
308	ε Draconis - - - - -	5	297 13 20.0	−2.08	−2.37	20 20 26.6	9.15	9.15
309	θ Aquilæ - - - - -	3	299 43 46.0	46.39	46.35	91 30 56.9	9.92	10.08
310	ρ Draconis - - - - -	5	300 24 52.0	4.89	4.69	22 48 29.2	10.13	10.15
311	1 α Capricorni - - - -	4	301 4 55.1	49.96	49.90	103 14 44.4	10.33	10.49
312	2 α Capricorni - - - -	3	301 10 49.9	49.97	49.83	103 16 22.0	10.38	10.52
313	1 σ Capricorni - - - -	5	301 22 43.0	52.10	52.02	109 50 54.5	10.42	10.59
314	2 σ Capricorni - - - -	5	301 23 12.0					
315	β Capricorni - - - -	3	301 52 36.5	50.65	50.5	105 31 14.5	10.57	10.73
316	ρ Capricorni - - - -	5	303 47 15.0	51.52	51.44	108 35 19.0	11.13	11.29
317	υ Capricorni - - - - -	5	306 35 19.0	51.45	51.37	108 57 56.8	11.93	12.09
318	α Delphini - - - - -	3	307 7 27.0	41.63	41.62	74 55 13.4	12.08	12.20
319	α Cygni - - - - -	1	308 18 51.3	30.53	30.54	45 33 59.9	12.41	12.50
320	ε Aquarii - - - - -	4	308 40 1.0	48.78	48.72	100 21 28.1	12.50	12.65
321	ε Cygni - - - - -	3	309 7 39.0	35.82	35.82	56 55 6.6	12.63	12.73
322	μ Aquarii - - - - -	4	309 55 21.8	48.60	48.54	99 52 3.3	12.84	12.98
323	19 Capricorni - - - -	4	310 18 10.0	51.13	51.04	108 48 58.6	12.95	13.09
324	η Capricorni - - - - -	5	312 40 43.0	51.51	51.42	110 47 13.2	13.66	13.71
325	θ Capricorni - - - - -	4	313 6 23.4	50.72	50.64	108 10 12.1	13.74	13.81
326	1 χ Capricorni - - - -	5	313 41 40.0	51.82	51.72	112 8 35.8	13.83	13.96
327	ν Aquarii - - - - -	5	314 7 30.0	49.07	49.00	102 19 42.8	13.93	14.07
328	φ Capricorni - - - - -	5	315 29 5.0	51.49	51.39	111 37 59.2	14.27	14.41
329	29 Capricorni - - - -	5	315 36 34.0	49.98	49.90	106 9 15.2	14.30	14.43
330	α Equulei - - - - -	4	315 57 23.0	44.89	44.86	85 43 52.8	14.39	14.50
331	ι Capricorni - - - - -	4	317 12 50.0	50.30	50.22	107 50 30.7	14.69	14.82
332	α Cephei - - - - -	3	318 12 28.0	21.29	21.24	28 25 26.7	14.92	14.97
333	ζ Capricorni - - - - -	4	318 13 48.4	51.71	51.58	113 26 8.4	14.93	15.09
334	b Capricorni - - - - -	5	318 45 3.0	51.46	51.38	112 50 16.9	15.05	15.18
335	β Aquarii - - - - -	3	319 43 37.8	47.43	47.37	96 36 50.8	15.27	15.38
336	ε Capricorni - - - - -	5	320 54 7.7	50.65	50.55	110 31 39.5	15.53	15.65
337	ξ Aquarii - - - - -	5,6	321 14 24.0	47.89	47.83	98 55 2.7	15.61	15.72
338	ρ Cygni - - - - -	4	321 14 34.0	33.60	33.68	45 27 38.1	15.61	15.72
339	β Cephei - - - - -	3	321 22 13.0	12.49	12.29	20 29 22.2	15.63	15.66
340	γ Capricorni - - - - -	4	321 41 26.0	49.89	49.81	107 43 58.5	15.70	15.82

DECLINATION.

Dr. BRADLEY's CATALOGUE OF FIXED STARS.

Numb. of Stars.	Names of the Stars.	Magnitude.	Mean Right Afcenfion, Jan. 1, 1760.			An. Precef. in Right Afcenfion,		Mean Diftance, from N. Pole, Jan. 1, 1760.			An. Precef. in Right Afcenfion,	
						1760.	1800.				1760.	1800.
			D.	M.	S.	S.	S.	D.	M.	S.	S.	S.
341	κ Capricorni - - - - -	5	322	18	23.0	50.37	50.27	109	56	48.1	15.84	15.95
342	λ Capricorni - - - - -	5	323	23	57.0	48.56	48.49	102	27	37.7	16.07	16.18
343	δ Capricorni - - - - -	3	323	26	28.3	49.62	49.53	107	12	12.9	16.08	16.18
344	2 π Cygni - - - - -	5	324	29	11.0	32.92	33.13	41	47	33.7	16.29	16.36
345	μ Capricorni - - - - -	5	325	2	44.4	48.93	48.85	104	40	7.9	16.40	16 51
346	ο Aquarii - - - - -	5	327	43	23.5	46.54	46.50	93	18	12.3	16.92	17.01
347	α Aquarii - - - - -	3	328	21	46.1	46.20	46.16	91	28	32.8	17.04	17.13
348	ι Aquarii - - - - -	5	328	21	47.5	48.74	48.67	105	1	22.8	17.04	17.13
349	35 Aquarii - - - - -	5	328	56	50.0	49.62	49.52	109	41	0.4	17.15	17.24
350	θ Aquarii - - - - -	4	331	2	16.2	47.46	47.38	98	58	6.0	17.51	17.60
351	ρ Aquarii - - - - -	5	331	53	18.2	47.42	47.37	99	1	0.3	17.65	17.73
352	γ Aquarii - - - - -	3	332	18	47.2	46 35	46.31	92	35	17.2	17.72	17.80
353	π Aquarii - - - - -	4	333	15	13.1	45.90	45.87	89	49	54.6	17.87	17.95
354	ζ Aquarii - - - - -	4	334	6	57.2	46.12	46.08	91	14	23.9	18.01	18.08
355	σ Aquarii - - - - -	5	334	28	51.9	47.74	47.53	101	53	52.2	18.06	18.14
356	7 Lacertæ - - - - -	4	335	21	45.0	36.31	36.40	40	56	41.6	18.19	18.25
357	υ Aquarii - - - - -	5	335	22	53.7	49.17	49.07	111	15	41.8	18.19	18.27
358	η Aquarii - - - - -	4	335	45	17.1	46.12	46.09	91	20	48.2	18.25	18.31
359	κ Aquarii - - - - -	5	336	19	46.5	46.70	46.66	95	27	29.5	18.33	18.37
360	1 τ Aquarii - - - - -	5	338	44	16.2	47.91	47.84	105	18	51.7	18.65	18.71
361	2 τ Aquarii - - - - -	4	339	12	56.9	47.81	47.74	104	51	8.5	18 71	18.77
362	λ Aquarii - - - - -	4	340	1	15.9	46.99	46.94	98	50	59.8	18 81	18.87
363	ι Cephei - - - - -	4	340	17	54.0	31.50	31.61	25	3	28.9	18.84	18.88
364	δ Aquarii - - - - -	3	340	28	21.6	47.98	47 91	107	5	26.6	18.86	18.92
365	Fomalhaut - - - - -	1	341	5	5.0	49.81	49.67	120	53	14.0	18.93	18.99
366	β Pifcium - - - - -	4	342	55	2.0	45.67	45.66	87	28	1.7	19.13	19.18
367	β Pegafi - - - - -	2	343	2	39 4	42.98	43.04	63	12	52.0	19.14	19.19
368	1 h Aquarii - - - - -	6	343	9	29.0	46.84	46.80	98	59	1.8	19.15	19.20
369	2 h Aquarii - - - - -	7	343	12	5.5	46.85	46.80	99	2	50.1	19.16	19.21
370	α Pegafi - - - - -	2	343	12	22.5	44.49	44.52	76	4	54.0	19.16	19 21
371	3 h Aquarii - - - - -	7	343	20	30.6	46.86	46.81	99	13	25.7	19.17	19.22
372	φ Aquarii - - - - -	4	345	28	15.9	46.56	46.54	97	20	17.5	19.37	19.41
373	1 ψ Aquarii - - - - -	5	345	49	32.6	46.83	46.78	100	23	26.6	19.40	19 44
374	χ Aquarii - - - - -	6	346	5	59.4	46.69	46.65	99	1	50.3	19.43	19.47
375	2 ψ Aquarii - - - - -	5	346	21	15.7	46.80	46.75	100	29	18.5	19.45	19.49
376	3 ψ Aquarii - - - - -	5	346	36	55.3	46.82	46.77	100	55	6.3	19.47	19.51
377	96 Aquarii - - - - -	5	346	44	13.0	46.45	46.41	96	25	55.7	19.48	19.52
378	d Caffiopeiæ - - - - -	5	348	34	10.0	38.77	38.99	29	1	52.2	19.62	19.64
379	1 κ Pifcium - - - - -	5	348	39	34.0	45.93	45.92	90	3	17.9	19.62	19.65
380	1 λ Andromedæ - - -	4	351	28	16.0	42.94	43.06	44	50	23.3	19.74	19.76
381	λ Pifcium - - - - -	5	352	27	10.0	45.91	45.90	89	32	21.0	19.84	19.86
382	19 Pifcium - - - - -	5	353	32	9 0	45.84	45.84	87	50	36.6	19.89	19.90
383	27 Pifcium - - - - -	5	356	35	49.0	46.03	46.01	—	—	—	19.98	19.98
384	ω Pifcium - - - - -	4	356	45	4.0	45.82	45.83	84	27	53.0	19.98	19.99
385	29 Pifcium - - - - -	5	357	22	56.0	46.00	45.98	94	21	48.5	19.99	20.00
386	30 Pifcium - - - - -	5	357	24	47.0	46.04	46.02	97	20	50.7	19 99	20.00
387	33 Pifcium - - - - -	5	358	15	47.0	46.00	45.98	97	3	0.5	20.00	20.00
388	α Andromedæ - - -	2	359	0	25.0	45.74	45.84	62	14	5.9	20.01	20.01
389	β Caffiopeiæ - - - -	3	359	7	40.0	45.45	45.72	32	10	25.0	20.01	20.01

DECLINA-

DECLINATION of some of the principal Fixed Stars, by Piazzi.

No.	Names of Stars.		Declin. Jan. 1, 1800.	Ann. Var.	AR.
			° ′ ″		h. ′
1	γ Pegasi	2 3	14 4 21 N	+20	0 3
2	ι Ceti	4	9 55 56 S	−20	9
3	κ Cassiop.	4	61 49 33 N	+19 9	22
4	ξ	4	52 47 41	+19 9	26
5	δ Andromedæ	3	29 45 55	+19 9	29
6	α Cassiop.	3	55 26 20	+19 9	29
7	β Ceti	2 3	19 5 8 S	−19 8	34
8	γ Cassiop.	3	59 37 54 N	+19 6	45
9	Polaris	3	88 14 24	+19 5	52
10	η Ceti	3 4	11 15 39 S	−19 4	59
11	θ Ceti	3	9 13 5	−19	I. 14
12	υ Persei	3 4	47 36 35 N	+18 6	26
13	ε Cassiop.	3 4	62 40 38	+18 1	40
14	γ Arietis	4 5	18 18 38	+18 0	43
15	β Arietis	3	19 49 32	+18 0	44
16	γ Andromedæ	3	41 21 46	+17 7	52
17	α Arietis	2 3	22 30 40	+17 5	56
18	γ Ceti	3	2 23 13	+15 7	II. 33
19	η Eridani	3	9 42 1 S	−15 0	47
20	γ Persei	3 4	52 42 41 N	+14 7	50
21	θ Eridani	2 3	41 6 37	−14 7	51
22	α Ceti	2	3 17 52	+14 6	52
23	α Persei	2 3	49 8 14	+13 5	III. 10
24	δ Persei	3 4	47 8 3	+12 3	29
25	δ Eridani	3 4	10 26 55 S	−11 9	34
26	ε Persei	3 4	39 25 7 N	+11 2	44
27	γ Eridani	2 3	14 5 8 S	−10 9	49
28	γ Tauri	3 4	15 8 3 N	+ 9 4	IV. 8
29	α	1	16 5 42	+ 8 1	24
30	ζ Orionis	4	2 6 12	+ 6 5	44
31	ε Aurigae	4	43 30 42	+ 6 2	48
32	ζ	4	40 46 5	+ 6 1	49
33	β Eridani	3	5 21 18 S	− 5 3	58
34	Capella	1	45 46 38 N	+ 5 0	V. 2
35	β Orionis	1	8 26 35	− 4 8	5
36	β Tauri	2	28 25 27	+ 4 0	14
37	γ Orionis	2	6 9 23 N	+ 4 0	14
38	δ	2	0 27 26	− 3 3	22
39	ε	2 3	1 20 28	− 2 9	26
40	ζ	3	2 3 33	− 2 6	31
41	α Columbæ	2	34 11 17	− 2 4	32
42	κ Orionis	3	9 45 3 S	− 1 9	38
43	δ Aurigæ	3 4	54 14 59 N	+ 1 5	43
44	α Orionis	1	7 21 26	+ 1 4	44
45	ζ Canis major	3	29 58 56 S	+ 1 1	VI. 13
46	β	2	17 52 2 S	+ 1 2	VI. 14
47	γ Gemini	3	16 33 29 N	− 2 3	26
48	ε	3	25 18 55	− 2 7	32
49	α Sirius	1	16 27 5 S	+ 3 2	36
50	ε Canis major	2	28 42 29	+ 4 4	51
51	δ	2	26 5 2	+ 5 2	VII. 0
52	δ Gemini	3 4	22 20 20 N	− 5 9	8
53	η Canis	2 3	28 55 16 S	+ 0 7	16
54	β Canis minor	3	8 40 56	− 6 5	16
55	Castor	2	32 18 46	− 7 6	22
56	Procyon	2	5 43 38	− 7 6	29
57	Pollux	2	28 29 48	− 7 9	33
58	ζ Navis		39 26 45	+ 9 7	VII. 57
59	δ Hydra	3	6 23 33	−12 0	VIII. 27
60	ι Ursæ major	3 4	48 48 59 N	−13 2	45
61	2 α Cancri	4	12 37 24	−13 4	48
62	α Hydræ	2	7 47 49 S	+15 2	IX. 18
63	θ Ursæ major	3	52 34 47 N	−15 3	19
64	Regulus	1	12 56 26	−17 2	58
65	γ Leonis	2	20 50 55	−17 7	X. 9
66	μ Ursæ major	3	42 30 0	−17 8	10
67	α Crateris	4	17 14 4 S	+19 9	50
68	α Ursæ	2	62 49 39 N	−19 1	51
69	β Crateris	3 4	21 44 6 S	+19 4	XI. 2
70	δ Leonis	3	21 37 3 N	−19 4	3
71	θ	3	16 31 17	−19 4	4
72	β	3	15 41 25	−19 9	39
73	γ Ursæ	2	54 48 25 N	+20 0	43
74	α Corvi	4	23 36 43 S	+20 0	58
75	δ	3	58 8 40	−20 0	XII. 5
76	γ Corvi	3	16 25 44 S	+20 0	6
77	η Virginis	3 4	0 26 48 N	−20 0	10
78	δ Corvi	3 4	15 23 58 S	+19 9	20
79	β	2 3	22 17 16	+19 9	24
80	κ Draconis	3	70 53 34 N	−19 9	25
81	γ Virginis	3	0 20 56 S	+19 8	32
82	δ	3 4	4 29 21 N	−19 6	46
83	Cor Caroli	2 3	39 24 7 N	−19 6	47
84	ε Virginis	3 4	12 2 18	−19 5	52
85	γ Hydra	3 4	22 6 38 S	+19 1	XIII. 8
86	Spica Virginis	1	10 6 43	+19 0	15
87	ζ	4	0 25 58	−18 7	24
88	η Ursæ	3	50 19 0 N	−18 2	40
89	ζ Hydræ	3	46 17 37 S	+18 0	43
90	η Bootis	3	19 24 28 N	−17 9	45

No.	Names of Stars.		Declin. Jan. 1, 1800.	Ann. Var.	AR.
			° ′ ″		h. ′
91	α Draconis	3 4	65 20 8 N	−17 4	XIII. 59
92	κ Virginis	4	9 20 5 S	+17 2	XIV. 2
93	Arcturus -	1	20 13 40 N	−17 0	7
94	θ Bootis -	3	52 46 50	−16 5	18
95	γ -	3	39 11 23	−16 2	24
96	ζ -	3 4	14 35 43	−15 8	32
97	ε -	3	27 55 31	−15 5	36
98	2 α Libræ	3	15 12 4 S	+15 3	40
99	ξ Bootis -	3	19 56 22 N	−15 2	42
100	β Lupi -	3	42 18 54 S	+15 0	45
101	γ Scorpii	3 4	24 29 3	−14 6	52
102	β Bootis	3 4	41 11 13 N	−14 5	54
103	β Libræ	2 3	8 38 1 S	+13 8	XV. 6
104	β Cor. Bor.	4	29 48 15 N	−12 9	20
105	ι Draconis	3	59 40 16 S	−12 8	20
106	γ Urfæ minor	4	72 32 44 N	−12 8	21
107	δ Serpentis	3	11 13 5	−12 5	25
108	α Cor. Bor.	2	27 23 49	−12 4	26
109	ζ Urfæ minor	4	78 24 8	−10 6	52
110	β Scorpii	2	19 14 39 S	+10 5	54
111	δ Ophiuchi	3	3 9 59	+ 9 7	XVI. 4
112	ε	3 4	4 11 32	+ 9 4	8
113	γ Herculis	3 4	19 38 2 N	− 9 0	13
114	Antares -	1	25 58 25	+ 8 7	17
115	η Draconis	3 4	61 58 16	− 8 4	21
116	β Herculis	2 3	21 56 9	− 8 3	22
117	ζ Ophiuchi	3	10 8 54 S	+ 8 0	26
118	ζ Herculis	3	31 58 25 N	− 7 4	34
119	κ Ophiuchi	3 4	9 41 53	− 6 2	48
120	ε Herculis	3	31 13 48	− 5 9	53
121	η Ophiuchi	2 3	15 27 48 S	+ 5 3	59
122	α Herculis	3 4	14 37 49 N	− 4 7	XVII. 6
123	δ	3 4	25 5 10	− 4 6	7
124	ε Urfæ minor	4	82 20 37 N	− 4 6	7
125	π Herculis	3	37 2 49	− 4 5	8
126	ζ Draconis	3	65 57 44	− 4 5	8
127	θ Ophiuchi	3	24 47 2	+ 4 4	10

No.	Names of Stars.		Declin. Jan. 1, 1800.	Ann. Var.	AR.
			° ′ ″		h. ′
128	α		12 43 6 N	− 3 0	XVII. 26
129	β Draconis	2	52 27 20	− 3 0	26
130	β Ophiuchi	3	4 39 48	− 2 3	34
131	γ	4	2 47 46	− 1 9	38
132	γ Draconis	2	51 31 7	− 0 7	52
133	α Lyræ	1	38 36 22	+ 3 0	XVIII. 30
134	δ Urfæ minor	3	86 33 43	+ 3 2	37
135	γ Lyræ	3	32 25 31	+ 4 5	51
136	ζ Aquilæ	3	13 34 45	+ 4 9	56
137	δ Draconis	3	67 18 37	+ 6 2	XIX. 12
138	δ Aquilæ	2	2 43 43	+ 6 5	15
139	β Cygni	3	27 32 58	+ 7 1	23
140	γ Aquilæ	3	10 8 15	+ 8 3	37
141	β	3	5 55 14	+ 8 9	45
142	α Capricorni	4	13 6 50 S	−10 5	XX. 7
143	2 α	3	13 9 9	−10 5	7
144	β	3 4	15 24 2	−10 7	10
145	γ Cygni	3	39 37 26 N	+11 1	15
146	β Delphini	4	13 54 35	+12 1	28
147	α	3	15 13 0	+12 2	30
148	α Cygni	1	44 34 22	+12 5	35
149	γ Delphini	4	15 24 49	+12 7	37
150	η Cephei	3 4	61 3 51	+12 9	41
151	ζ Cygni	3	29 24 52	+14 4	XXI. 4
152	β Aquarii	3 4	6 26 30 S	−15 4	21
153	β Cephei	3	69 41 4 N	+15 7	26
154	δ Capricorni	3	17 1 31 S	−16 2	36
155	γ Aquarii	3 4	2 23 18	+17 8	XXII. 11
156	ζ	4	1 2 16	−18 1	19
157	ζ Pegafi	3	9 47 33 N	+18 5	31
158	δ Aquarii	3 4	16 52 44 S	−18 9	44
159	Fomalhaut	1	30 40 38	−19 0	47
160	β Pegafi	2	27 0 7 N	+19 2	54
161	α	1	14 7 59	+19 2	55
162	γ Cephei	3	76 30 59	+19 9	XXIII. 31
163	α Androm.	1	27 59 11	+20 0	58
164	β Caffiop.	2 3	58 2 49	+20 0	59

A TABLE

A TABLE of the Declinations of fome of the Principal Fixed Stars, taken from Mr. POND's obfervations in the Philofophical Tranfactions for 1806.

	Greenwich.		Armagh.		Palermo.		Weftbury. Co-lat. 38° 45′ 42″.8.		Mean of circular Inftruments reduced to Jan. 1800.
	° ′ ″		° ′ ″		° ′ ″		° ′ ″		° ′ ″
γ Draconis	38 28 53.0	−0.6	38 28 53.8	+0.2	38 28 52.0	−1.6	38 28 53.6	0.0	38 28 53.6
Capella	44 13 21.5	+1.5	44 13 21.3	+1.3	44 13 18.5	−1.5	44 13 18.3	−1.7	44 13 20.0
α Cygni	45 25 41.4	+2.6	45 25 39.3	+0.5	45 25 38.4	−0.4	45 25 36.8	−2.0	45 25 38.8
α Lyræ	57 23 41.1	+4.5	51 23 37.1	+0.6	51 23 36.8	+0.3	51 23 35.8	−0.7	51 23 36.5
Caftor	57 41 14.0	+1.0	*57 41 9.3	——	57 41 13.0	0.0	57 41 13.8	+0.8	57 41 13.0
Pollux	61 30 9.8	−2.5	*61 30 4.1	——	61 30 11.2	−1.1	61 30 13.5	+1.2	61 30 12.3
β Tauri	61 34 30.9	−2.1	61 34 32.3	−0.7	61 34 33.8	−0.6	61 34 33.5	+0.5	61 34 33.0
α Andromedæ	62 00 45.8	−1.7	62 00 45.0	−2.5	62 00 47.5	0.0	62 0 49.8	+2.3	62 0 47.5
α Coron. B.	62 36 10.5	+0.5	62 36 7.3	−2.7	62 36 9.8	−0.2	62 36 12.8	+2.8	62 36 10.0
α Arietis	67 29 20.1	−1.4	67 29 22.0	+0.5	67 29 21.7	+0.2	67 29 20.5	−1.0	67 29 21.5
Arcturus	69 46 7.8	−1.2	69 46 11.0	+2.0	69 46 10.3	+1.2	69 46 7.3	−1.7	69 46 9.0
Aldebaran	73 54 16.6	−0.3	73 54 18.3	+1.4	73 54 16.8	+0.1	73 54 15.3	−1.6	73 54 16.9
β Leonis	74 18 34.5	+1.0	74 18 34.0	+0.5	74 18 33.5	+0.5	74 18 32.3	−1.2	74 18 33.5
α Pegafi	75 51 57.0	−2.7	75 52 1.0	+1.3	75 52 0.8	+1.1	75 51 57.8	−.9	75 51 59.7
γ Pegafi	75 55 36.3	−1.9	75 55 37.5	−0.7	75 55 41.4	+3.2	75 55 36.8	−1.4	75 55 38.2
Regulus	77 3 35.1	+1.1	77 3 32.0	−2.0	77 3 36.0	+2.0	77 3 33.8	−0.2	77 3 34.0
α Ophiuchi	77 16 54.0	+0.8	77 16 53.4	+0.2	77 16 53.0	−0.2	77 16 53.3	+0.1	77 16 53.2
α Aquilæ	81 38 52.0	+1.0	81 38 50.6	−0.4	81 38 53.5	+2.5	81 38 51.3	+0.3	81 38 51.0
α Orionis	82 38 30.8	−0.9	82 38 31.8	+0.1	82 38 32.0	+0.3	82 38 31.3	−0.4	82 38 31.7
α Serpentis	82 56 1.2	−1.1	82 55 59.8	−2.4	82 56 5.0	+2.9	82 56 2.0	−0.3	82 56 2.3
Procyon	84 16 17.4	−3.6	84 16 19.3	−1.7	84 16 21.0	0.0	84 16 21.3	+0.3	84 16 21.0
α Ceti	86 42 6.1	−2.9	86 42 7.3	−1.3	86 42 9.8	+0.8	86 42 10.2	+1.2	86 42 9.0
β Virginis	87 6 26.3	−2.0	87 6 29.0	+0.7	87 6 27.5	−0.8	not obferved.	——	87 6 28.3
α Aquarii	91 16 59.8	−4.3	91 17 4.6	+0.5	91 17 3.2	−0.2	91 17 4.6	+0.5	91 17 4.1
α Hydræ	97 47 49.1	−3.0	97 47 48.8	−3.2	97 47 54.0	+2.0	97 47 53.0	+1.0	97 47 52.0
Rigel	98 26 28.8	−6.0	98 26 33.0	−1.8	98 26 34.5	−0.3	98 26 36.3	+0.5	98 26 34.8
Spica Virginis	100 6 37.0	−3.8	100 6 38.8	−2.0	100 6 41.8	+1.0	100 6 42.8	+2.0	100 6 40.8
2 α Capricorni	103 9 3.2	−5.1	*103 9 13.3	——	103 9 8.2	−0.1	103 9 7.8	−0.5	103 9 8.3
α Libræ	105 11 55.6	−6.2	105 12 00.9	−0.9	105 12 2.7	+0.9	not obferved.	——	105 12 1.8
Sirius	106 26 56.3	−7.2	106 27 4.1	+0.6	106 27 4.0	+0.5	106 27 1.8	−1.7	106 27 3.5
Antares	115 58 14.4	−9.7	115 58 24.3	——	115 58 24.0	——	not obferved.	——	115 58 24.1
Fomalhaut	120 40 30.9	−9.3	——	——	120 40 40.2	——	not obferved.	——	——
Polaris	1 45 34.5	——	1 45 34.5	——	1 45 36.2	——	1 45 37.0	——	1 45 36.0

The ftars marked * are omitted in the comparifon.

The laft column is the mean of the beft obfervations the author could procure, compared with his own, and is probably correct to the neareft fecond.

TABLE I.

The mean right Afcenfions and North-polar Diftances of Thirty-fix principal Fixed Stars, to the Beginning of the Year 1802; with their Annual Preceffions, Annual Proper Motions, and Annual Variations, from the lateft Obfervations.

Names of Stars.	Right Afcenfion in Signs, Degrees, &c.	Annual Precef-fion.	Annual proper motion.	Annual Varia-tion.	Right Afcen-fion in Time.	Annual Precef-fion.	Annual proper motion.	Annual Varia-tion.	Number of Obfervations	Diftance from the North Pole.	Annual Precef-fion.	Annual proper motion.	Annual Variation.	Magnitude.
	S. D. M. S.	S.	S.	S.	H. M S.	S.	S.	S.		D. M. S.	S.	S.	S.	
γ Pegafi	0 0 45 46.8	46.13	−0.09	46.04	0 3 3.12	3.075	−0.006	3.069	125	75 54 55.9	−20.05	−0.15N	−20.20	2
α Arietis	0 29 0 34.1	50.08	+0.10	50.20	1 56 2.27	3.339	+0.007	3.347	85	67 28 45.2	−17.54	+0.07 S	−17.47	2.3
α Ceti	1 12 59 6.3	46.84	−0.12	46.73	2 51 56.42	3.123	−0.008	3.115	29	86 41 36.6	−14.67	−0.08N	−14.75	2
Aldebaran	2 6 8 34.5	51.34	+0.03	51.39	4 24 34.30	3.423	+0.002	3.426	92	73 54 0.6	− 8.11	+0.12 S	− 8.00	1
Capella	2 15 31 14.4	66.01	+0.21	66.23	5 2 4.96	4.401	+0.014	4.415	53	44 13 12.4	− 5.01	+0.44 S	− 4.57	1
Rigel	2 16 15 24.1	43.17	−0.03	43.14	5 5 1.61	2.878	−0.002	2.876	56	98 26 19.0	− 4.76	−0.16N	− 4.92	1
β Tauri	2 18 26 45.8	56.70	+0.01	56.71	5 13 47.05	3.780	+0.001	3.781	15	61 34 23.1	− 4.02	+0.10 S	− 3.91	2
α Orion	2 26 6 48.9	48.65	+0.01	48.65	5 44 27.26	3.243	+0.001	3.243	115	82 38 27.8	− 1.36	−0.13N	− 1.49	1
Sirius	3 9 6 21.8	40.21	−0.42	39.80	6 36 25.45	2.681	−0.028	2.653	56	106 27 4.7	+ 3.17	+1.04 S	+ 4.21	1
Caftor	3 20 29 7.7	57.95	−0.15	57.80	7 21 56.51	3.863	−0.010	3.853	31	57 41 28.0	+ 7.02	+0.14 S	+ 7.06	[illegible]
Procyon	3 22 13 54.0	47.93	−0.80	47.13	7 28 55.60	3.195	−0.053	3.142	106	84 16 34.4	+ 7.59	+0.95 S	+ 8.53	1.2
Pollux	3 23 17 40.2	56.05	−0.74	55.32	7 33 10.68	3.737	−0.049	3.688	68	61 30 25.7	+ 7.93	0.00	+ 7.93	2
α Hydræ	4 19 27 49.5	44.28	−0.09	44.19	9 17 51.30	2.952	−0.006	2.946	27	97 48 19.3	+15.24	−0.14N	+15.10	2
Regulus	4 29 27 12.0	48.41	−0.22	48.18	9 57 48.80	3.227	−0.015	3.212	65	77 4 9.5	+17.27	−0.08N	+17.19	1
β Leonis	5 24 44 13.1	46.58	−0.57	46.01	11 38 56.87	3.105	−0.038	3.067	44	74 19 14.6	+19.97	+0.07 S	+20.04	1.2
β Virginis	5 25 5 41.6	46.14	+0.74	46.88	11 40 22.77	3.076	+0.049	3.125	13	87 7 6.7	+19.98	+0.24 S	+20.22	3
Spica Virginis	6 18 41 40.5	47.22	−0.02	47.21	13 14 46.70	3.148	−0.001	3.147	66	100 7 14.6	+18.99	−0.19N	+18.80	1
Arcturus	7 1 39 28.8	42.18	−1.26	40.92	14 6 37.92	2.812	−0.084	2.728	174	69 46 45.4	+17.07	+1.72 S	+18.79	1
1 α Libræ	7 9 56 22.2	49.54	−0.11	49.44	14 39 45.48	3.303	−0.007	3.296	26	105 9 41.9	+15.37	−0.18N	+15.19	6
2 α Libræ	7 9 59 12.0	49.56	−0.11	49.45	14 39 56.80	3.304	−0.007	3.297	26	105 12 26.0	+15.36	−0.15N	+15.21	2
α Cor. Bor.	7 21 34 36.8	37.92	+0.26	38.18	15 26 18.45	2.528	+0.017	2.445	66	62 36 35.5	+12.46	+0.03 S	+12.49	2.3
α Serpentis	7 23 37 50.8	44.05	+0.11	44.18	15 34 31.39	2.937	+0.007	2.945	61	82 56 24.6	+11.89	−0.19N	+11.70	2
Antares	8 4 19 21.5	54.87	0.00	54.87	16 17 17.43	3.658	0.000	3.658	59	115 58 31.2	+ 8.69	−0.26N	+ 8.43	1
α Herculis	8 16 24 21.1	40.97	0.00	40.97	17 5 37.41	2.731	0.000	2.731	22	75 22 15.6	+ 4.71	−0.23N	+ 4.48	2
α Ophiuchi	8 21 26 12.1	41.58	+0.06	41.64	17 25 44.81	2.772	+0.004	2.776	190	77 17 0.0	+ 2.99	+0.05 S	+ 3.03	2
α Lyræ	9 7 33 29.5	30.20	+0.23	30.40	18 30 13.97	2.013	+0.015	2.027	67	51 23 35.3	− 2.64	−0.27N	− 2.91	1
γ Aquilæ	9 24 12 38.0	42.80	−0.11	42.69	19 36 50.53	2.853	−0.007	2.846	83	79 51 26.8	− 8.22	−0.16N	− 8.38	3
α Aquilæ	9 25 16 46.9	43.40	+0.48	43.88	19 41 7.13	2.893	+0.032	2.925	- -	81 38 33.8	− 8.56	−0.54N	− 9.11	1.2
β Aquilæ	9 26 23 46.1	44.21	−0.03	44.16	19 45 35.07	2.947	−0.002	2.944	78	84 4 33.0	− 8.91	+0.35 S	− 8.57	3.4
1 α Capricorni	10 1 39 55.3	50.04	0.00	50.04	20 6 39.69	3.336	0.000	3.336	13	103 6 22.9	−10.53	−0.28N	−10.80	3
2 α Capricorni	10 1 45 52.2	50.04	+0.05	50.09	20 7 3.48	3.336	+0.003	3.339	137	103 8 41.6	−10.56	−0.26N	−10.81	3
α Cygni	10 8 40 13.7	30.63	−0.08	30.57	20 34 40.91	2.042	−0.005	2.038	48	45 25 16.4	−12.53	−0.03N	−12.56	1.2
α Aquarii	10 28 54 6.4	46.29	−0.08	46.21	21 55 36.43	3.086	−0.005	3.081	136	91 16 25.1	−17.17	−0.19N	−17.36	3
Fomalhaut	11 11 40 12.1	49.80	+0.35	50.15	22 46 40.81	3.320	+0.023	3.343	25	120 39 52.7	−19.04	−0.06N	−19.10	1.2
α Pegafi	11 13 43 33.5	44.64	−0.06	44.60	22 54 54.23	2.976	−0.004	2.973	135	75 51 18.2	−19.25	−0.18N	−19.43	2
α Andromedæ	11 29 32 39.1	45.97	+0.08	46.05	23 58 10.61	3.063	+0.005	3.070	142	62 0 5.8	−20.05	+0.06 S	−19.99	2

DECLINATION.

TABLE II.

CORRECTIONS of R. A. in Time of the STARS in the preceding Catalogue to every Tenth Day in the Year: Copied exactly from Dr. MASKELYNE's; excepting α Herculis, which has been added.

N. B. In this Table an allowance is made for the Motion of each Star as set down at the bottom of its Column.

	γ Pegasi	α Arietis	α Ceti	Aldebaran	Capella	Rigel	β Tauri	α Orionis	Sirius	Castor	Procyon	Pollux	α Hydræ	Regulus	β Leonis	β Virginis
	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Jan. 0	−0.19	+0.50	+0.75	+1.21	+1.77	+1.25	+1.44	+1.32	+1.41	+1.59	+1.33	+1.51	+1.07	+0.92	+0.39	+0.39
10	0.30	0.38	0.65	1.15	1.76	1.24	1.45	1.36	1.47	1.74	1.47	1.67	1.29	1.19	0.72	0.70
20	0.41	0.25	0.55	1.07	1.69	1.18	1.42	1.35	1.48	1.83	1.55	1.77	1.47	1.41	1.01	0.98
30	0.50	0.11	0.41	0.97	1.55	1.03	1.34	1.29	1.45	1.86	1.58	1.81	1.59	1.59	1.27	1.23
Feb. 9	0.57	−0.03	0.27	0.83	1.39	0.97	1.21	1.20	1.37	1.84	1.55	1.79	1.64	1.71	1.50	1.45
19	- -	0.17	0.13	0.69	1.18	0.81	1.05	1.07	1.24	1.77	1.50	1.74	1.71	1.79	1.64	1.62
Mar. 1	- -	0.28	−0.01	0.52	0.95	0.65	0.88	0.93	1.09	1.65	1.40	1.63	1.70	1.83	1.81	1.75
11	- -	0.38	- -	0.35	0.70	0.48	0.69	0.76	0.92	1.49	1.27	1.49	1.65	1.82	1.91	1.85
21	- -	- -	- -	0.19	0.46	0.31	0.51	0.59	0.74	1.31	1.12	1.32	1.56	1.77	1.95	1.89
31	- -	- -	- -	0.06	0.24	0.14	0.33	0.43	0.56	1.13	0.96	1.15	1.45	1.69	1.97	1.91
Apr. 10	- -	- -	- -	−0.05	0.04	0.00	0.18	0.27	0.38	0.93	0.80	0.96	1.32	1.59	1.95	1.89
20	- -	- -	- -	0.13	−0.09	−0.11	- -	0.15	0.22	0.75	0.65	0.79	1.19	1.48	1.90	1.85
30	- -	- -	- -	0.17	0.18	0.19	- -	0.05	0.08	0.59	0.51	0.63	1.05	1.34	1.83	1.79
May 10	- -	- -	- -	0.15	0.23	0.24	- -	−0.01	−0.04	0.46	0.39	0.50	0.91	1.22	1.74	1.72
20	+0.49	- -	- -	0.11	0.20	0.24	- -	0.02	0.13	0.36	0.30	0.40	0.79	1.10	1.64	1.67
30	0.79	- -	- -	0.00	0.13	0.19	- -	0.00	0.17	0.30	0.25	0.33	0.69	0.99	1.53	1.53
June 9	1.07	- -	- -	+0.15	0.00	0.09	- -	+0.06	0.17	0.28	0.22	0.30	0.58	0.90	1.43	1.44
19	1.41	+0.85	- -	0.33	+0.20	+0.04	- -	0.17	0.13	0.30	0.23	0.32	- -	0.82	1.33	1.34
29	1.73	1.17	+0.81	0.55	0.45	0.20	- -	0.31	0.06	0.37	0.28	0.37	- -	0.76	1.23	
July 9	2.03	1.49	1.09	0.81	0.75	0.40	- -	0.49	+0.05	0.48	0.35	0.46	- -	0.72	1.14	
19	2.33	1.82	1.39	1.08	1.08	0.63	- -	0.70	0.21	0.64	0.48	0.61	- -	0.71	1.06	
29	2.6[illegible]	2.15	1.70	1.37	1.44	0.87	- -	0.93	0.38	0.82	0.62	0.76	- -	0.71		
Aug. 8	2.85	2.47	2.00	1.67	1.82	1.14	+1.57	1.19	0.58	1.04	0.80	0.97	- -	0.74		
18	3.06	2.76	2.29	1.97	2.22	1.41	1.89	1.46	0.81	1.29	1.00	1.19	- -	0.81		
28	3.23	3.03	2.57	2.29	2.63	1.70	2.22	1.74	1.06	1.56	1.22	1.44	- -	0.91		
Sept. 7	3.37	3.27	2.83	2.58	3.04	1.98	2.55	2.03	1.32	1.86	1.45	1.71	- -	1.03		
17	3.46	3.49	3.07	2.88	3.44	2.27	2.89	2.32	1.60	2.17	1.71	2.01	- -	1.19		
27	3.52	3.67	3.29	3.16	3.84	2.55	3.21	2.61	1.89	2.50	1.99	2.32	- -	1.37		
Oct. 7	3.55	3.82	3.47	3.43	4.23	2.81	3.53	2.90	2.18	2.84	2.27	2.64	+1.57	1.59		
17	3.55	3.94	3.63	3.67	4.59	3.07	3.83	3.18	2.46	3.19	2.57	2.98	1.83	1.83		
27	3.51	4.02	3.76	3.90	4.93	3.31	4.11	3.45	2.75	3.54	2.87	3.32	2.11	2.11	1.55	
Nov. 6	3.45	4.07	3.86	4.09	5.31	3.52	4.37	3.70	3.02	3.89	3.10	3.66	2.41	2.40	1.79	
16	3.37	4.09	3.93	4.27	5.52	3.71	4.61	3.93	3.28	4.24	3.45	4.00	2.72	2.71	2.06	2.05
26	3.28	4.08	3.97	4.41	5.75	3.87	4.82	4.13	3.51	4.56	3.73	4.31	3.03	3.04	2.36	2.34
Dec. 6	3.18	4.05	3.99	4.51	5.94	3.99	5.00	4.31	3.72	4.86	3.99	4.61	3.34	3.37	2.65	2.65
16	3.07	3.97	3.96	4.57	6.07	4.08	5.13	4.45	3.88	5.13	4.22	4.87	3.63	3.68	3.02	2.97
26	2.95	3.89	3.91	4.61	6.14	4.13	5.21	4.55	4.01	5.35	4.41	5.10	3.91	3.98	3.35	3.31
31	2.89	3.83	3.89	4.61	6.16	4.13	5.23	4.58	4.06	5.45	4.49	5.20	4.03	4.12	3.50	3.47
Mots.									"	"	"	"		"		
in R. A.	- -	- -	- -	- -	- -	- -	- -	- -	−0.042	−0.019	−0.053	−0.062	- -	−0.027		
in P. D.	- -	- -	- -	- -	- -	- -	- -	- -	+1.20							

COR-

TABLE II.—*continued.*

CORRECTIONS of R. A. in Time to every Tenth Day—*continued.*

	Spica ♍	Arcturus	α ♎ 2de	α Coronæ	α Serps[s]	Antares	α Herculis	α Ophiuchi	α Lyræ	α Aquilæ	α 2da	α Cygni	α ♒	Fomalhaut	α Pegasi	α Androm.
	″	″		″	″	″	″		″	″		″		″	″	″
Jan. 0	−0.19	−0.49	−0.63	−0.97	−0.88	−1.15	−1.26		−1.67	−1.27	- -	−1.59	- -	−0.73	−0.58	−0.2
10	+0.16	0.17	0.31	0.67	0.60	0.85	1.11	″	1.55	1.20	- -	1.64	- -	0.81	0.67	0.3
20	0.50	+0.17	+0.02	0.36	0.31	0.53	0.82	−0.83	1.38	1.09	- -	1.64	- -	0.87	0.73	0.4
30	0.80	0.48	0.35	0.04	0.00	0.20	0.54	0.58	1.17	0.95	- -	1.58	- -	0.91	- -	0.5
Feb. 9	1.06	0.79	0.67	+0.29	+0.31	+0.13	0.29	0.31	0.93	0.77	- -	1.47	- -	0.92	- -	0.6
19	1.33	1.08	0.97	0.61	0.61	0.48	+0.01	0.03	0.65	0.57	- -	1.31	- -	0.89	- -	0.7
Mar. 1	1.55	1.34	1.25	0.92	0.90	0.81	0.29	+0.27	0.35	0.36	- -	1.11	- -	0.82		
11	1.73	1.56	1.50	1.21	1.17	1.13	0.59	0.55	0.04	0.11	″ -	0.87	- -	0.71		
21	1.88	1.75	1.72	1.47	1.42	1.44	0.87	0.84	+0.29	+0.17	+0.13	0.58	- -	0.58		
31	1.99	1.91	1.92	1.70	1.65	1.73	1.15	1.12	0.63	0.44	0.41	0.27	- -	0.40		
Ap. 10	2.06	2.03	2.08	1.89	1.85	1.99	1.42	1.39	0.95	0.72	0.70	+0.07	- -	0.19		
20	2.11	2.11	2.21	2.07	2.02	2.23	1.65	1.65	1.27	1.02	0.99	0.41	- -	+0.06		
30	2.13	2.16	2.33	2.21	2.17	2.45	1.86	1.86	1.57	1.31	1.31	0.78	- -	0.35		
May 10	2.13	2.19	2.41	2.30	2.29	2.63	2.09	2.09	1.85	1.60	1.61	1.15	- -	0.65		
20	2.10	2.18	2.45	2.37	2.37	2.79	2.27	2.28	2.10	1.87	1.91	1.50	- -	0.98		
30	2.06	2.15	2.48	2.40	2.43	2.91	2.43	2.44	2.32	2.13	2.20	1.83	- -	1.32	+1.14	+0.7
June 9	2.00	2.10	2.47	2.40	2.46	3.00	2.55	2.56	2.49	2.37	2.47	2.14	″ -	1.67	1.46	1.1
19	1.92	2.03	2.45	2.37	2.46	3.05	2.63	2.65	2.63	2.58	2.71	2.41	+2.12	2.01	1.70	1.4
29	1.83	1.93	2.39	2.30	2.43	3.07	2.65	2.70	2.72	2.75	2.93	2.65	2.40	2.35	2.07	1.7
July 9	1.73	1.82	2.31	2.21	2.37	3.05	2.66	2.71	2.76	2.89	3.10	2.83	2.64	2.67	2.35	2.1
19	1.63	1.70	- -	2.09	2.29	2.99	2.61	2.70	2.75	2.99	3.24	2.97	2.87	2.95	2.61	2.4
29	1.53	1.57	- -	1.94	2.19	2.90	2.52	2.63	2.70	3.05	3.33	3.04	3.04	3.21	2.84	2.7
Aug. 8	1.42	1.41	- -	1.77	2.07	2.78	2.42	2.53	2.59	3.06	3.38	3.07	3.08	3.42	3.03	2.9
18	1.32	1.27	- -	1.60	1.91	2.64	2.25	2.41	2.44	3.03	3.38	3.03	3.28	3.59	3.18	3.1
28	1.24	1.15	- -	1.42	- -	2.47	2.12	2.26	2.25	2.96	3.34	2.95	3.33	3.71	3.28	3.3
Sept. 7	1.16	1.03	- -	1.24	- -	2.30	1.93	2.09	2.03	2.85	3.26	2.81	3.35	3.77	3.35	3.4
17	1.13	0.91	- -	- -	- -	2.14	1.76	1.91	1.79	2.74	3.15	2.64	3.33	3.80	3.37	3.5
27	1.11	0.84	- -	- -	- -	1.98	1.59	1.74	1.54	2.58	3.02	2.43	3.27	3.78	3.37	3.[illegible]
Oct. 7	1.14	0.80	- -	- -	- -	1.85	1.42	1.57	1.29	2.42	2.87	2.19	3.17	3.73	3.32	3.[illegible]
17	1.21	0.80	- -	- -	- -	1.75	1.28	1.43	1.04	2.25	2.71	1.94	3.07	3.63	3.25	3.[illegible]
27	1.33	0.85	- -	- -	- -	1.65	1.17	1.39	0.81	2.09	2.55	1.96	2.95	3.51	3.16	3.[illegible]
Nov. 6	1.42	0.95	- -	- -	- -	1.66	1.10	- -	0.62	1.94	2.41	1.43	2.81	3.37	3.05	3.[illegible]
16	1.65	1.09	- -	- -	- -	1.69	1.09	- -	0.47	1.82	2.29	1.19	2.68	3.23	2.93	3.[illegible]
26	1.93	1.27	- -	- -	- -	1.78	1.10	- -	0.35	1.73	2.19	0.97	2.56	3.07	2.81	3.[illegible]
Dec. 6	2.21	1.50	- -	- -	- -	1.93	1.15	- -	0.28	1.66	2.12	0.78	2.45	2.92	2.65	3.1
16	2.51	1.77	- -	+1.18	- -	2.13	1.24	- -	0.27	1.65	- -	0.62	2.35	2.72	2.57	3.[illegible]
26	2.83	2.07	- -	1.42	+1.92	2.37	1.40	- -	0.30	1.65	- -	0.50	2.25	2.67	2.46	2.[illegible]
31	3.00	2.22	+2.67	1.56	2.05	2.51	1.47	- -	0.35	1.68	- -	0.45	- -	2.61	2.41	2.[illegible]
Mot[s]		″														
in R.A.	- -	−0.093	- -	- -	- -	- -	- -	- -	- -	″						
in P. D.	- -	+2.01	- -	- -	- -	- -	- -	- -	- -	+0.038						

DECLINATION.

TABLE III.

CORRECTIONS of R. A. in Time to every Tenth Degree of Long. of ☽'s Ascending Node.
Copied from Dr. MASKELYNE's; with the Addition of α Herculis.

Arg. Long. of ☊	γ Pegasi.	α Arietis.	α Ceti.	Aldebaran.	Capella.	Rigel.	β Tauri.	α Orionis.	Spica ♍	Arcturus	α ♎ 2d
S ° S	″	″	″	″	″	″	″	″	″	″	″
O. o VI.	−0.16+	−0.23+	−0.03+	−0.07+	−0.17+	+0.03−	−0.07+	+0.01+	−0.11+	+0.20−	−0.13+
10	0.35	0.43	0.22	0.29	0.44	−0.15+	0.31	0.21	0.30	0.03	0.33
20	0.52	0.62	0.41	0.49	0.69	0.33	0.53	0.40	0.48	−0.15+	0.53
I. o VII.	0.68	0.79	0.58	0.67	0.93	0.49	0.73	0.58	0.65	0.33	0.70
10	0.82	0.94	0.73	0.84	1.13	0.63	0.92	0.75	0.80	0.49	0.85
20	0.94	1.05	0.87	0.98	1.31	0.77	1.07	0.89	0.93	0.63	0.98
II. o VIII.	1.03	1.14	0.97	1.09	1.44	0.87	1.20	1.00	1.02	0.77	1.08
10	1.08	1.19	1.05	1.17	1.53	0.95	1.29	1.09	1.09	0.87	1.15
20	1.10	1.21	1.10	1.21	1.57	1.00	1.33	1.14	1.12	0.95	1.18
III. o IX.	1.09	1.19	1.11	1.21	1.56	1.03	1.34	1.15	1.12	1.00	1.17
10	1.05	1.13	1.09	1.19	1.51	1.01	1.31	1.13	1.08	1.02	1.13
20	0.97	1.03	1.03	1.11	1.41	0.97	1.23	1.08	1.01	1.01	1.06
IV. o X.	0.87	0.91	0.95	1.01	1.27	0.90	1.13	0.99	0.91	0.97	0.95
10	0.73	0.76	0.83	0.88	1.09	0.80	0.98	0.88	0.79	0.90	0.81
20	0.58	0.59	0.69	0.73	0.87	0.67	0.81	0.73	0.64	0.80	0.65
V. o XI.	0.41	0.39	0.53	0.54	0.63	0.53	0.61	0.57	0.47	0.67	0.47
10	0.23	0.19	0.35	0.35	0.37	0.37	0.39	0.39	0.28	0.53	0.28
20	0.03	+0.02−	1.17	0.14	0.10	0.20	0.16	0.19	0.09	0.37	0.07
VI. o XII.	+0.16−	0.23	+0.03−	+0.07−	+0.17−	0.03	+0.07−	−0.01+	0.11−	0.20	+0.13−

Arg. Long. of ☊	α Coronæ	α Serps.	Antares.	α Herculis	α Ophiuchi.	Sirius.	Castor.	Procyon.	Pollux.	α Hydræ	Regulus.
S ° S.	″	″	″	″	″	″	″	″	″	″	″
O o VI.	+0.21−	+0.05−	−0.13+	+0.15−	+0.02−	−0.03+	+0.13−	+0.03−	+0.13−	−0.07+	+0.13−
10	0.05	−0.13+	0.36	0.03	−0.15+	0.19	−0.11+	−0.17+	−0.10+	0.25	−0.07+
20	−0.11+	0.31	0.57	−0.08+	0.31	0.35	0.34	0.37	0.33	0.42	0.27
I. o VII.	0.27	0.48	0.77	0.20	0.47	0.50	0.57	0.55	0.55	0.58	0.47
10	0.42	0.63	0.94	0.30	0.61	0.63	0.78	0.71	0.75	0.73	0.64
20	0.55	0.77	1.08	0.40	0.74	0.75	0.97	0.85	0.93	0.85	0.80
II. o VIII	0.67	0.88	1.19	0.49	0.84	0.84	1.12	0.97	1.09	0.94	0.93
10	0.77	0.97	1.27	0.56	0.92	0.91	1.25	1.06	1.21	1.01	1.03
20	0.85	1.02	1.30	0.62	0.97	0.95	1.33	1.11	1.29	1.05	1.11
III. o IX.	0.90	1.05	1.30	0.64	0.99	0.95	1.37	1.13	1.33	1.05	1.15
10	0.92	1.04	1.25	0.67	0.98	0.93	1.38	1.12	1.33	1.03	1.15
20	0.91	1.00	1.17	0.66	0.93	0.89	1.34	1.07	1.29	0.97	1.12
IV. o X.	0.88	0.93	1.05	0.64	0.87	0.81	1.26	0.99	1.22	0.88	1.06
10	0.82	0.83	0.91	0.59	0.77	0.71	1.14	0.89	1.11	0.76	0.96
20	0.74	0.71	0.71	0.52	0.65	0.59	0.99	0.75	0.96	0.63	0.83
V. o XI.	0.63	0.57	0.53	0.45	0.51	0.45	0.81	0.59	0.78	0.47	0.69
10	0.51	0.40	0.31	0.35	0.36	0.30	0.60	0.41	0.58	0.30	0.51
20	0.36	0.23	0.09	0.26	0.19	0.14	0.37	0.22	0.36	0.12	0.33
VI. o XII	0.21	0.05	+0.13−	0.15	0.02	+0.03−	0.13	0.03	0.13	+0.07−	0.13

Arg. Long. of ☊	β Leonis.	β Virginis	α Lyræ.	α Aquilæ.	α ♑ 2da.	α Cygni.	α ♒	Fomal.	α Pegasi.	α Androm.
S ° S	″	″	″	″	″	″	″	″	″	″
O o VI.	+0.17−	+0.03−	−0.06+	−0.04+	+0.08−	−0.39+	+0.01−	+0.36−	−0.15+	−0.33+
10	−0.02+	−0.15+	0.19	0.21	−0.13+	0.51	−0.17+	0.15	0.33	9.52
20	0.21	0.34	0.31	0.39	0.33	0.61	0.36	−0.07+	0.30	0.69
I. o VII.	0.40	0.52	0.41	0.55	0.53	0.70	0.54	0.28	0.66	0.83
10	0.58	0.68	0.51	0.69	0.71	0.77	0.69	0.49	0.79	0.95
20	0.73	0.81	0.59	0.81	0.86	0.81	0.83	0.67	0.91	1.05
II. o VIII.	0.87	0.93	0.65	0.91	0.99	0.83	0.95	0.85	0.99	1.11
10	0.98	1.02	0.99	0.98	1.09	0.81	1.03	0.99	1.05	1.13
20	1.06	1.07	0.72	1.02	1.15	0.78	1.08	1.10	1.07	1.13
III. o IX	1.11	1.09	0.72	1.03	1.19	0.73	1.10	1.19	1.06	1.09
10	1.12	1.09	0.69	1.01	1.18	0.65	1.09	1.23	1.01	1.01
20	1.10	1.04	0.65	0.95	1.14	0.55	1.04	1.23	0.94	0.91
IV. o X.	1.05	0.97	0.59	0.87	1.07	0.43	0.96	1.21	0.84	0.77
10	0.96	0.86	0.51	0.76	0.96	0.31	0.85	1.14	0.71	0.62
20	0.85	0.73	0.41	0.63	0.82	0.17	0.72	1.04	0.57	0.44
V. o XI.	0.70	0.58	0.31	0.48	0.66	0.03	0.56	0.95	0.40	0.25
10	0.54	0.41	3.19	0.31	0.48	+0.11−	0.39	0.74	0.22	0.07
20	0.36	0.22	0.06	0.14	0.28	0.25	0.21	0.56	0.03	+0.14−
VI. o XII.	0.17	0.03	+0.06−	+0.04−	0.08	0.39	0.01	0.36	+0.15−	−0.33+

DECLINATION.

The following Tables are calculated to give the Corrections in N. P. D. for the Stars of Dr. Maſkelyne's Catalogue, as the foregoing, copied from his Tables XVII. and XVIII. do in R. A.

Table IV. compriſes the effects of præceſſion, aberration, and the ſolar inequality for every 10th day of the year.

Table V. compriſes the effect of nutation, for every 10th degree of longitude of the moon's node.

They neither of them contain any allowance for the motions in the ſtars themſelves; which ſeem, as yet, not to be ſufficiently aſcertained.

Theſe Tables are adapted to the year 1800; but the differences are inconſiderable, for many years before and after that period.

TABLE IV.

CORRECTIONS in N. P. D. for every 10th Day of the Year.

	γ Pegaſi	α ♈	α Ceti	Aldebaran	Capella	Rigel	β ♉	α Orionis	Sirius	Caſtor	Procyon	Pollux	α Hydræ	Regulus	β Leonis	β Virginis
	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″
Jan. 0	−3.62	−5.82	+0.61	−1.33	−4.37	+2.89	−1.71	+1.21	+1.78	+3.73	+2.29	+3.94	+0.17	+5.14	+6.71	+2.56
10	2.87	5.56	1.24	1.11	5.68	4.33	2.27	2.01	3.17	3.3[illegible]	3.49	3.82	2.32	6.50	8.38	4.55
20	1.92	5.14	1.84	.82	6.82	5.64	2.52	2.74	6.02	2.85	4.64	3.62	4.35	7.71	9.72	6.37
30	0.91	4.40	2.49	.54	7.80	6.80	2.74	3.36	7.86	2.13	5.40	3.11	6.12	8.41	10.74	7.84
Feb. 9	0.00	3.70	2.92	.31	8.52	7.70	2.99	3.85	9.98	1.42	6.13	2.66	7.89	9.07	11.58	9.26
19	+0.88	2.94	3.27	.06	8.92	8.36	3.11	4.27	10.73	.76	6.73	2.21	9.44	9.33	12.00	10.43
Mar. 1	1.78	2.12	3.49	+ .22	9.24	8.81	3.19	4.52	11.79	.06	7.14	1.49	10.65	9.69	12.29	11.36
11	2.61	1.07	3.74	.53	9.18	9.06	3.19	4.72	12.51	− .79	7.34	.86	11.56	9.52	12.11	11.95
21	3.13	.28	3.67	.78	8.81	8.98	2.92	4.77	12.99	1.22	7.45	.36	12.40	9.42	11.65	12.22
31	3.41	+ .47	3.48	.97	8.23	8.66	2.68	4.75	13.07	1.67	7.44	− .09	12.94	8.97	11.12	12.41
Apr. 10	3.54	1.20	3.17	1.18	7.34	8.36	2.57	4.62	13.08	2.03	7.26	.59	13.13	8.33	10.39	12.39
20	3.49	1.62	2.51	1.19	6.26	7.30	1.85	4.39	12.37	2.24	6.98	.67	13.22	7.76	9.49	12.09
30	2.86	1.79	1.65	1.20	5.08	6.24	1.36	3.98	11.41	2.11	6.60	.70	13.09	7.28	8.46	11.65
May 10	2.11	1.74	.59	1.03	3.74	4.92	1.00	3.48	10.34	1.99	6.17	.72	12.83	6.73	7.56	11.13
20	.92	1.57	− .52	.69	2.36	3.44	.42	2.82	8.91	1.75	5.54	.69	12.15	5.99	6.44	10.50
30	− .51	.95	2.04	.33	1.01	1.78	.08	2.09	7.23	1.31	4.94	.65	11.47	5.50	5.66	9.96
June 9	2.27	.09	3.64	− .22	+ .24	− .05	+ .22	1.16	5.40	.75	4.10	.20	10.62	5.00	4.90	9.29
19	4.12	−1.13	5.39	1.12	1.40	2.03	.39	.26	3.38	.00	3.46	+ .42	9.72	4.66	4.37	8.73
29	6.12	2.36	7.07	1.80	2.50	3.95	.54	− .76	1.29	+ .52	2.70	.82	8.54	4.22	3.83	8.04
July 9	8.37	3.91	9.01	2.76	3.24	5.94	.42	1.82	− .84	1.26	1.78	1.33	7.39	4.04	3.45	7.40
19	10.62	5.66	10.72	3.88	3.87	7.82	.28	2.88	2.93	2.12	1.04	1.90	6.26	3.97	3.27	6.85
29	12.74	7.25	12.2[illegible]	4.6[illegible]	4.31	9.60	.11	3.99	4.93	2.78	.31	2.43	4.99	3.83	3.27	6.34
Aug. 8	14.81	9.2[illegible]	13.80	5.8[illegible]	4.53	11.15	− .05	4.85	6.73	3.54	− .33	3.07	3.94	3.99	3.54	6.05
18	16.70	11.18	15.28	6.77	4.52	12.46	.43	5.57	8.21	4.38	.88	3.77	3.02	4.31	4.05	5.91
28	18.66	12.98	16.64	7.70	4.28	13.49	.89	6.26	9.49	5.13	1.25	4.51	2.20	4.68	4.76	5.89
Sept 7	20.26	14.59	17.24	8.45	3.91	4.11	1.28	6.71	10.37	5.90	1.43	5.19	1.25	5.28	5.59	5.97
17	21.50	16.25	17.97	9.15	3.33	14.41	1.69	6.99	10.83	6.71	13 4	5.89	1.34	6.10	6.65	6.29
27	22.84	17.74	18.43	9.72	2.63	14.23	2.08	7.04	10.94	7.45	.95	6.81	1.50	7.39	7.92	6.82
Oct. 7	23.75	19.11	18.64	10.13	1.75	13.90	2.51	6.88	10.53	8.30	.46	7.56	1.89	8.47	9.51	7.71
17	24.45	20.14	18.46	10.34	.71	13.17	2.86	6.49	9.65	8.95	+ .25	8.43	2.26	9.74	11.52	8.75
27	25.03	21.12	18.22	10.47	− .43	12.12	3.26	5.94	8.56	9.58	1.22	9.04	3.32	11.33	13.19	10.13
Nov. 6	25.36	22.00	17.83	10.50	1.64	10.81	3.80	5.23	6.94	10.05	2.36	9.77	4.65	13.05	15.26	11.70
16	25.43	22.69	17.27	10.46	3.01	9.34	4.49	4.37	4.83	10.69	3.75	10.52	6.31	14.86	17.47	13.51
26	25.27	23.00	16.53	10.28	4.38	7.69	5.11	3.45	3.02	10.88	4.93	11.26	7.99	16.50	19.47	15.24
Dec. 6	25.00	23.52	15.87	10.04	5.80	6.05	5.65	2.48	.83	11.04	6.38	11.67	10.00	18.31	21.69	17.32
16	24.65	23.50	15.16	9.83	7.25	4.37	6.13	1.52	+1.47	11.04	7.70	11.77	12.10	20.05	23.79	19.40
26	24.10	48	14.48	9.60	8.67	2.70	6.45	.61	3.80	10.90	9.21	11.78	14.29	21.81	25.81	21.55
31	23.53	23.27	14.08	9.49	9.34	1.95	6.59	.17	4.91	10.74	9.76	11.78	15.32	22.45	26.65	22.49

TABLE

TABLE IV.—*continued.*

CORRECTIONS in N. P. D. for every Tenth Day of the Year.—*continued.*

	Spica ♍	Arcturus	α ♎ 2da	α Coronæ	α Serps	Antares	α Herculis	α Ophiuchi	α Lyræ	α Aquilæ	α ♑ 2da	α Cygni	α ♒	Fomalhaut	α Pegasi	α Androm.
	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″
Jan. 0	−2.04	+7.56	−3.29	+5.68	+2.85	−3.64	+2.88	+2.25	+0.95	+0.09	+2.57	−6.29	+1.35	+9.85	−3.28	−8.15
10	.04	9.78	1.72	10.18	4.89	3.51	3.11	4.36	3.93	1.60	2.88	3.72	2.02	9.39	2.32	7.30
20	+1.97	11.72	.09	12.39	6.83	2.80	7.24	6.38	6.81	2.99	3.10	1.00	2.65	8.71	1.20	6.13
30	3.77	13.15	+1.41	14.23	8.46	2.07	9.10	8.20	9.60	4.62	3.36	+2.55	3.40	7.89	+ .10	4.73
Feb. 9	5.70	14.36	3.03	14.78	9.98	1.22	10.76	9.78	11.96	5.93	4.41	4.19	3.88	6 71	1.25	3.36
19	7.32	15.15	4.64	15.83	11.19	.37	12.08	11.10	13.99	7.04	3.35	7.00	4.21	5.28	2.51	1.89
Mar. 1	8.85	15.52	5.96	17.37	12.05	+ .51	12.96	12.08	15.65	7.89	3.14	9.33	4.37	3.63	3.29	.32
11	9.82	15.35	7.13	17.28	12.52	1.38	13.53	12.64	16.75	8.53	2.87	11.51	4.47	2.03	4.14	+1.20
21	10.90	14.92	8.25	16.87	12.73	2.25	13.68	12.84	17.34	8.79	2.22	13.11	4.18	− .09	4.78	2.46
31	11.76	14.15	9.21	16.01	12.63	3.08	13.70	12.24	17.30	8.66	1.62	14.03	3.65	2.13	5.01	3.56
Ap. 10	12.24	12.95	9.85	14.63	12.08	3.79	12.75	12.05	16.84	8.29	.88	14.63	3.02	4.11	5.17	4.48
20	12.68	11.64	10.47	13.02	11.26	4.46	11.72	11.06	15.67	7.56	− .17	14.56	1.98	6.45	4.78	5.08
30	12.93	10.14	10.92	11.12	10.47	5.11	10.36	9.84	14.06	6.30	1.30	13.64	.64	8.69	4.05	5.21
May 10	13.41	8.59	11.22	8.94	9.37	5.72	8.78	8.33	11.97	4.87	1.54	12.64	− .88	10.92	3.00	5.07
20	13.15	6.77	11.31	6.76	8.02	6.12	6.95	6.55	9.59	3.24	3.75	10.93	2.47	12.97	1.76	4.51
30	12.98	5.19	11.27	4.54	6.72	6.62	5.02	4.68	6.74	1.35	5.04	8.73	4.36	15.03	.05	3.45
June 9	12.64	3.64	11.18	2.37	5.39	7.03	3.01	2.71	3.74	− .78	6.35	6.06	6.35	16.92	−1.95	2.00
19	12.31	2.35	11.00	.37	4.15	7.45	1.09	.82	1.70	2.76	7.52	3.10	8.31	18.49	4.06	.36
29	11.66	1.08	10.67	− .48	2.87	7.69	− .84	−1.11	−2.40	4.74	8.50	.02	10.12	19.64	6.17	−1.67
July 9	11.08	.10	10.39	3.07	1.79	7.95	2.58	2.86	5.40	6.77	9.45	−3.32	12.01	20.61	8.55	3.87
19	10.55	− .56	10.00	4.34	.87	8.12	4.13	4.44	8.20	8.66	10.23	6.71	13.78	21.25	10.94	6.35
29	9.76	1.12	9.46	5.44	− .03	8.14	5.55	5.86	10.86	10.32	10.72	9.98	15.18	21.33	13.10	8.76
Aug. 8	9.11	1.19	8.96	6.02	.62	8.16	6.69	7.06	13.22	11.93	11.20	13.34	16.61	21.26	15.30	11.28
18	8.55	.99	8.50	6.19	.97	7.98	7.52	7.77	15.16	13.25	11.46	16.25	17.74	20.86	17.41	13.85
28	8.00	.51	7.89	6.06	1.15	7.76	8.06	8.61	17.11	14.29	11.61	19.06	18.72	20.14	19.31	16.36
Sept. 7	7.38	+ .16	7.36	5.85	1.20	7.35	8.41	9.00	17.98	15.26	11.62	21.48	19.26	19.06	20.66	18.63
17	7.10	1.29	6.95	4.67	.88	6.97	8.34	9.07	18.73	15.68	11.39	23.34	19.74	17.94	22.16	20.74
27	6.97	2.68	6.59	3.30	.36	6.42	8.04	8.84	18.96	16.05	11.22	25.23	20.02	16.66	23.21	22.76
Oct. 7	7.06	4.38	6.36	1.75	+ .42	5.98	7.39	8.34	18.78	16.27	10.98	26.53	20 12	15.42	24.34	24.46
17	7.18	6.17	6.23	+ .03	1.30	5.41	6.50	7.59	18.14	16.06	10.59	27.19	19.89	13.88	24.85	25.91
27	7.74	8.53	6.29	1.33	2.62	4.95	5.25	6.53	16.03	15.68	10.24	27.59	19.65	12.65	25.25	27.19
Nov. 6	8.56	10.73	6.63	5.88	4.05	4.56	3.78	5.22	15.54	15.09	9.93	27.49	19.32	11.57	25.45	28.21
16	9.69	13.34	7.24	7.57	5.80	4.28	1.99	3.61	13.62	14.25	9.54	26.81	18.82	10.58	25.38	28.78
26	10.82	15.90	7.84	10.30	7.54	3.88	.07	1.88	11.36	13.17	9.15	25.62	18.16	9.73	25.02	29.13
Dec. 6	12.38	18.37	8.88	13.12	9.51	4.03	+1.97	+ .02	9.04	12.00	8.79	24.46	17.58	9.28	24.56	29.26
16	14.11	20.98	10.03	15.99	11.58	4.16	4.18	2.06	6.18	10.71	8.47	22.42	16.94	9.06	23.93	29.10
26	16.04	23.51	11.45	18.84	13.71	4.48	6.51	4.41	2.98	9.24	8.13	20.06	16.26	9.11	23.1[illegible]	28.64
31	16.94	24.53	12.09	20.14	14.75	4.62	7.51	5.21	1.55	8.46	7.97	18.72	15.83	9.16	22.31	28.31

DECLINATION.

TABLE V.

CORRECTIONS in N. P. D. for every 10° of Longitude of ☽'s ☊.

S ° S	γ Pegasi.	α ♈	α Ceti.	Aldebaran.	Capella.	Rigel.	β ♉	α Orionis.	Sirius.	Castor.	Procyon.
	"	"	"	"	"	"	"	"	"	"	"
O. o VI.	−0.10+	−4.37+	−6.13+	−8.16+	−8.71+	−8.75+	−8.82+	−8.97+	−8.89+	−8.30+	−8.27+
10	+1.08−	3.28	5.20	7.56	8.29	8.33	8.45	8.69	8.94	8.59	8.57
20	2.21	2.10	4.09	6.74	7.62	7.66	7.83	8.28	8.72	8.65	8.60
I. o VII	3.28	.85	2.87	5.70	6.71	6.78	6.96	7.54	8.22	8.40	8.41
10	4.23	+ .43−	1.55	4.50	5.59	5.66	5.90	6.58	7.48	7.89	7.92
20	5.07	1.68	.20	3.17	4.42	4.40	4.64	5.41	6.51	7.15	7.16
II. o VIII	5.75	2.89	+1.18−	1.74	2.91	2.99	3.25	4.08	5.35	6.18	6.29
10	6.27	4.01	2.50	.25	1.40	1.47	1.76	2.63	4.03	5.02	5.16
20	6.59	5.01	3.76	+1.24−	+ .13−	+ .05−	.21	1.10	2.58	3.72	3.89
III. o IX.	6.70	5.85	4.90	2.70	1.67	1.59	+1.34−	+ .47−	1.05	2.30	2.50
10	6.61	6.53	5.89	4.08	3.18	3.08	2.85	2.02	+ .51−	.80	1.00
20	6.33	7.00	6.71	5.33	4.56	4.48	4.28	3.51	2.06	+ .70−	+ .07−
IV. o X.	5.85	7.26	7.31	6.42	5.81	5.75	5.56	4.89	3.53	2.20	1.98
10	5.21	7.31	7.69	7.32	6.88	6.83	6.70	6.13	4.91	3.62	3.41
20	4.38	7.11	7.83	7.98	7.75	7.72	7.60	7.18	6.14	4.93	4.74
V. o XI.	3.43	6.71	7.77	8.41	8.39	8.37	8.29	8.01	7.17	6.11	5.93
10	2.48	6.10	7.44	8.58	8.74	8.74	8.74	8.60	7.99	7.09	6.93
20	1.26	5.31	6.90	8.49	8.85	8.87	8.91	8.91	8.57	7.85	7.71

S ° S.	Pollux.	α Hydræ	Regulus.	β Leonis.	β Virginis.	Spica ♍	Arcturus.	α ♎ 2	α Coronæ	α Serp.	Antares.
	"	"	"	"	"	"	"	"	"	"	"
O o VI.	−8.22+	−5.84+	−4.60+	−0.86+	−0.78+	+2.84+	+4.69−	+5.71−	+6.98−	+7.17−	+8.04−
10	8.57	6.62	5.52	1.99	1.91	1.70	3.62	4.73	6.15	6.37	7.41
20	8.60	7.21	6.28	3.07	2.99	.51	2.45	3.62	5.15	5.39	6.56
I. o VII.	8.41	7.57	6.85	4.05	3.98	− .70+	1.21	2.39	3.98	4.23	5.50
10	7.93	7.70	7.21	4.91	4.85	1.89	− .07+	1.03	2.68	2.94	4.28
20	7.25	7.60	7.35	5.61	5.57	3.01	1.35	− .24+	1.32	1.58	2.94
II. o VIII	6.36	7.28	7.27	6.16	6.12	4.05	2.59	1.57	− .09+	.16	1.51
10	5.24	6.73	6.97	6.50	6.49	4.96	3.76	2.85	1.50	−1.26+	−0.02+
20	3.92	6.00	6.46	6.66	6.65	5.72	4.79	4.04	2.86	2.65	1.46
III. o IX.	2.59	5.04	5.76	6.62	6.62	6.32	5.69	5.11	4.14	3.96	2.91
10	1.09	3.95	4.86	6.36	6.39	6.70	6.43	6.02	5.29	5.15	4.26
20	+ .44−	2.74	3.84	5.93	5.96	6.89	6.95	6.75	6.27	6.17	5.48
IV. o X.	1.86	1.45	2.69	5.30	5.35	6.89	7.27	7.28	7.08	7.01	6.54
10	3.36	.10	1.45	4.52	4.57	6.66	7.38	7.57	7.66	7.63	7.40
20	4.65	+1.39−	.17	3.60	3.67	6.23	7.25	7.65	7.99	8.02	8.03
V. o XI.	5.81	2.53	+1.11−	2.57	2.64	5.61	6.91	7.50	8.07	8.19	8.42
10	6.88	3.76	2.35	1.42	1.53	4.82	6.35	7.11	7.97	8.09	8.54
20	7.67	4.87	3.52	.30	.38	3.89	5.60	6.51	7.59	7.75	8.42

S ° S	α Herculis.	α Ophiuchi.	α Lyræ.	α Aquilæ.	α ♑ 2da.	α Cygni.	α ♒	Fomal.	α Pegasi.	α Androm.
	"	"	"	"	"	"	"	"	"	"
O o VI.	+8.72−	+8.82−	+8.85−	+8.10−	+7.65−	+6.98−	+4.66−	+2.84−	+2.55−	+0.10−
10	8.29	8.51	8.85	8.55	8.14	7.54	5.58	3.89	3.62	1.25
20	7.65	7.86	8.60	8.56	8.38	7.98	6.33	4.82	4.58	2.38
I. o VII.	6.76	7.13	8.09	8.41	8.37	8.12	6.89	5.61	5.40	3.43
10	5.67	6.11	7.33	7.99	8.10	7.99	7.24	6.23	6.06	4.38
20	4.39	4.90	6.38	7.36	7.59	7.65	7.37	6.73	6.54	5.18
II. o VIII	2.98	3.54	5.18	6.48	6.85	7.07	7.27	6.89	6.82	5.84
10	1.48	2.06	3.83	5.41	5.89	6.27	6.96	6.89	6.87	6.52
20	− .04+	.54	2.39	4.19	4.77	5.29	6.43	6.70	6.73	6.61
III. o IX	1.59	−1.01+	.86	2.82	3.49	4.14	5.71	6.31	6.40	6.69
10	3.08	2.53	− .69+	1.37	2.11	2.86	4.82	5.72	5.86	6.57
20	4.47	3.96	2.21	− .13+	.66	1.50	3.78	4.96	5.14	6.26
IV. o X.	5.74	5.29	3.68	1.61	− .80+	.83	2.62	4.05	4.27	5.75
10	6.88	6.45	5.06	3.04	2.24	−1.32+	1.38	3.01	3.27	5.06
20	7.70	7.40	6.23	4.38	3.61	2.69	.10	1.89	2.17	4.23
V. o XI.	8.34	8.14	7.23	5.60	4.88	3.98	−1.18+	.70	1.00	3.26
10	8.72	8.62	8.02	6.64	6.00	5.15	2.42	− .54+	− .21+	2.20
20	8.84	8.85	8.56	7.48	6.92	6.05	3.59	1.70	1.40	1.06

DECLINATION.

Table VI.

POLARIS.

Mean R. A. for Jan. 0. 1800.			Mean N. P. D. for Jan. 0. 1800.	
	h ′ ″			
By Maſkelyne's Obſ. as deduced by La Lande - -	0 52 23. 3	An. Præc.	As calculated from that given by Dr. Maſkelyne to M. G. Roy.	
By Brinkley's Obſ. -	0 52 24. 6	″		An Præc.
Mean of the two - -	0 52 23.950	+12.911	1°45′34″.65	−19″.520
1801 - - -	0 52 36.861	- -	1 45 15.13	19.516
1802 - - -	0 52 49.839	- -	1 44 55.61	19.512
1803 - - -	0 53 2.844	- -	1 44 36.10	19.508
1804 - - -	0 53 15.956	- -	1 44 16.59	19.504
1805 - - -	0 53 29.135	- -	1 43 57.09	19.50
1806 - - -	0 53 42.381	- -	1 43 37.59	
1807 - - -	0 53 55.694	- -	1 43 18.10	
1808 - - -	0 54 9.074	- -	1 42 58.61	
1809 - - -	0 54 22.521	- -	1 42 39.12	
1810 - - -	0 54 36.035	+13.581	1 42 19.64	−19.48

Corrections for every 10th Day of the Year.

		R. A. in Time.	N. P. D.
Jan.	0	+ 2″.99	−19″.74
	10	− 3.20	19.21
	20	9.61	19.54
	30	15.57	18.48
Feb.	9	21.20	17.18
	19	25.79	15.44
March	1	30.25	13.36
	11	33.48	10.85
	21	35.69	8.41
	31	36.66	5.90
Apr.	10	36.57	2.81
	20	35.24	.21
	30	33.16	+ 2.23
May	10	28.93	4.51
	20	24.35	6.64
	30	18.72	8.17
June	9	12.51	9.27
	19	5.71	9.92
	29	+ 1.50	10.18
July	9	8.92	9.68
	19	16.10	8.54
	29	22.84	7.05
Aug.	8	29.54	4.78
	18	35.24	2.07
	28	40.29	− 1.29
Sept.	7	44.31	4.71
	17	47.26	8.68
	27	49.12	12.76
Oct.	7	49.67	16.85
	17	49.31	20.78
	27	47.72	24.71

Corrections for every 10th Day of the Year.—*continued.*

		R. A. in Time.	N. P. D.
Nov.	6	+45″.00	−28″.33
	16	41.39	31.43
	26	36.80	34.12
Dec.	6	31.49	36.35
	16	25.57	38.02
	26	19.51	39.08
	31	16.59	39.24

Corrections for every 10° of Longitude of ☽'s ☊.

	R. A. in Time.	N. P. D.
S ° S	″	″
O. 0 VI.	−18.99+	− 2.06+
10	19.44	.90
20	19.33	+ .28−
I. 0 VII.	18.66	1.48
10	17.39	2.61
20	15.61	3.67
II. 0 VIII.	13.31	4.62
10	10.62	5.42
20	7.68	6.06
III. 0 IX.	4.44	6.52
10	1.05	6.77
20	+ 2.35−	6.81
IV. 0 XI.	5.68	6.68
10	8.79	6.32
20	11.69	5.77
V. 0 X.	14.25	5.04
10	16.35	4.17
20	17.95	3.16

Table VII.

A Table for calculating the Annual Præceſſion of a Star in R. A. in Time.

Argument.—The R. A. of the Star in Time.

Hours	0 + 12 —	1 + 13 —	2 + 14 —	3 + 15 —	4 + 16 —	5 + 17 —	Hours.
Minutes. ′	″	″	″	″	″	″	′ Minutes.
0	0.000	0.346	0.668	0.945	1.157	1.291	60
2	0.011	.357	.678	.953	1.163	1.294	58
4	.023	.369	.688	.961	1.169	1.297	56
6	.035	.380	.698	.969	1.175	1.300	54
8	.047	.391	.708	.977	1.180	1.302	52
10	.059	.402	.718	.985	1.186	1.305	50
12	.070	.413	.728	.993	1.191	1.307	48
14	.081	.424	.738	1.001	1.196	1.310	46
16	.093	.435	.747	1.009	1.201	1.312	44
18	.105	.446	.757	1.017	1.206	1.314	42
20	.117	.457	.767	1.024	1.211	1.316	40
22	.128	.468	.776	1.031	1.216	1.318	38
24	.139	.479	.786	1.039	1.221	1.320	36
26	.151	.490	.795	1.046	1.226	1.322	34
28	.163	.501	.805	1.053	1.231	1.323	32
30	.174	.512	.814	1.060	1.235	1.325	30
32	.186	.522	.823	1.067	1.239	1.327	28
34	.197	.533	.832	1.074	1.244	1.328	26
36	.209	.543	.841	1.081	1.248	1.329	24
38	.220	.554	.850	1.088	1.252	1.330	22
40	.232	.565	.859	1.095	1.256	1.331	20
42	.243	.576	.868	1.101	1.260	1.332	18
44	.255	.586	.877	1.108	1.264	1.333	16
46	.266	.597	.885	1.114	1.268	1.334	14
48	.278	.607	.894	1.121	1.271	1.334	12
50	.289	.617	.902	1.127	1.275	1.335	10
52	.301	.627	.911	1.133	1.278	1.335	8
54	.312	.638	.920	1.140	1.282	1.336	6
56	.323	.648	.929	1.146	1.285	1.336	4
58	.334	.658	.937	1.152	1.288	1.337	2
60	0.346	0.668	0.945	1.157	1.291	1.337	0
Hours	11 + 23 —	10 + 22 —	9 + 21 —	8 + 20 —	7 + 19 —	6 + 18 —	Hours.

The number of ſeconds and their decimals taken out of this Table being multiplied by the natural tangent of the ſtar's declination, and applied with their reſpective ſign to + 3″ 068 will give the annual præceſſion in R. A.

If the ſtar's declination be ſouth, the number ſo found muſt be applied with a contrary ſign.

Table VIII.

Decimal Numbers for multiplying the Annual Præceſſion of a Star in R. A. with their Complements.

	Dec.	Com.
Jan. 1	.01	.99
3	.02	.98
6	.03	.97
9	.04	.96
12	.05	.95
15	.06	.94
19	.07	.93
22	.08	.92
25	.09	.91
28	.10	.90
Feb. 1	.11	.89
4	.12	.88
8	.13	.87
12	.14	.86
16	.15	.85
21	.16	.84
25	.17	.83
Mar. 2	.18	.82
7	.19	.81
12	.20	.80
17	.21	.79
22	.22	.78
27	.23	.77
Apr. 1	.24	.76
6	.25	.75
11	.26	.74
15	.27	.73
20	.28	.72
24	.29	.71
28	.30	.70
May 2	.31	.69
5	.32	.68
9	.33	.67
12	.34	.66

	Dec.	Com.
May 16	.35	.65
19	.36	.64
22	.37	.63
25	.38	.62
28	.39	.61
31	.40	.60
June 3	.41	.59
6	.42	.58
9	.43	.57
12	.44	.56
15	.45	.55
18	.46	.54
21	.47	.53
24	.48	.52
27	.49	.51
29	.50	.50
July 2	.51	.49
5	.52	.48
8	.53	.47
11	.54	.46
14	.55	.45
17	.56	.44
20	.57	.43
23	.58	.42
27	.59	.41
30	.60	.40
Aug. 3	.61	.39
6	.62	.38
10	.63	.37
14	.64	.36
18	.65	.35
22	.66	.34
26	.67	.33
30	.68	.32

	Dec.	Com.
Sept. 4	.69	.31
9	.70	.30
14	.71	.29
19	.72	.28
24	.73	.27
29	.74	.26
Oct. 4	.75	.25
9	.76	.24
14	.77	.23
18	.78	.22
23	.79	.21
27	.80	.20
31	.81	.19
Nov. 4	.82	.18
8	.83	.17
11	.84	.16
15	.85	.15
18	.86	.14
21	.87	.13
24	.88	.12
27	.89	.11
30	.90	.10
Dec. 3	.91	.09
6	.92	.08
9	.93	.07
12	.94	.06
15	.95	.05
18	.96	.04
21	.97	.03
23	.98	.02
26	.99	.01
29	1.00	.00
31	1.01	—.01

N. B.—The ſmall ſemi-annual equation of præceſſion is allowed for in this Table.

For decimals of a year, ſee the Table of Multipliers, after the Table for finding the annual præceſſion of a ſtar in N. P. D.

Table IX.

A Table for finding the Annual Preceſſion of a Star in N. P. D.

Argument.—The R. A. of the Star in Time.

Minutes.	0 − / 12 +	1 − / 13 +	2 − / 14 +	3 − / 15 +	4 − / 16 +	5 − / 17 +	Minutes.
′	″	″	″	″	″	″	′
0	20.05	19.37	17.36	14.18	10.02	5.19	60
2	20.04	19.32	17.28	14.06	9.87	5.03	58
4	20.04	19.27	17.19	13.93	9.72	4.85	56
6	20.03	19.22	17.10	13.80	9.57	4.68	54
8	20.03	19.17	17.00	13.67	9.41	4.51	52
10	20.02	19.12	16.92	13.54	9.26	4.34	50
12	20.02	19.07	16.82	13.41	9.10	4.17	48
14	20.01	19.02	16.73	13.28	8.95	4.00	46
16	20.00	18.96	16.62	13.15	8.79	3.83	44
18	19.99	18.90	16.52	13.02	8.63	3.66	42
20	19.98	18.84	16.42	12.89	8.47	3.48	40
22	19.96	18.78	16.32	12.76	8.31	3.31	38
24	19.94	18.72	16.22	12.62	8.15	3.14	36
26	19.92	18.66	16.12	12.49	7.99	2.97	34
28	19.90	18.59	16.01	12.35	7.83	2.79	32
30	19.88	18.53	15.91	12.21	7.67	2.62	30
32	19.85	18.46	15.80	12.07	7.51	2.44	28
34	19.83	18.39	15.69	11.93	7.35	2.27	26
36	19.80	18.32	15.58	11.79	7.19	2.09	24
38	19.77	18.25	15.47	11.65	7.03	1.92	22
40	19.74	18.17	15.36	11.50	6.86	1.75	20
42	19.71	18.09	15.25	11.36	6.70	1.68	18
44	19.68	18.02	15.13	11.21	6.53	1.40	16
46	19.65	17.94	15.02	11.07	6.37	1.23	14
48	19.61	17.86	14.90	10.92	6.20	1.05	12
50	19.57	17.78	14.78	10.77	6.03	.88	10
52	19.53	17.70	14.66	10.62	5.86	.70	8
54	19.49	17.62	14.54	10.47	5.70	.53	6
56	19.45	17.53	14.42	10.32	5.53	.35	4
58	19.41	17.45	14.30	10.17	5.36	.18	2
60	19.37	17.36	14.18	10.02	5.19	.00	0
Hours	11 + / 23 −	10 + / 22 −	9 + / 21 −	8 + / 20 −	7 + / 19 −	6 + / 18 −	Hours.

(Header row labels: Hours. … Hours.)

Table X.

Decimal Parts of a Year, with their Complements, for multiplying the Annual Præceſſion of a Star in N.P.D.: Applicable to any regular Annual Motion whatever.

	Dec.	Com.		Dec.	Com.		Dec.	Com.
Jan. 4	.01	.99	May 1	.33	.67	Sept. 2	.67	.33
7	.02	.98	4	.34	.66	5	.68	.32
11	.03	.97	8	.35	.65	9	.69	.31
15	.04	.96	11	.36	.64	13	.70	.30
18	.05	.95	15	.37	.63	16	.71	.29
22	.06	.94	19	.38	.62	20	.72	.28
26	.07	.93	22	.39	.61	24	.73	.27
29	.08	.92	26	.40	.60	27	.74	.26
Feb. 2	.09	.91	30	.41	.59	Oct. 1	.75	.25
6	.10	.90	June 2	.42	.58	5	.76	.24
9	.11	.89	6	.43	.57	8	.77	.23
13	.12	.88	10	.44	.56	12	.78	.22
16	.13	.87	13	.45	.55	16	.79	.21
20	.14	.86	17	.46	.54	19	.80	.20
24	.15	.85	21	.47	.53	23	.81	.19
27	.16	.84	24	.48	.52	27	.82	.18
Mar. 3	.17	.83	28	.49	.51	30	.83	.17
7	.18	.82	July 2	.50	.50	Nov. 3	.84	.16
10	.19	.81	5	.51	.49	6	.85	.15
14	.20	.80	9	.52	.48	10	.86	.14
18	.21	.79	13	.53	.47	14	.87	.13
21	.22	.78	16	.54	.46	17	.88	.12
25	.23	.77	20	.55	.45	21	.89	.11
29	.24	.76	24	.56	.44	25	.90	.10
Apr. 1	.25	.75	27	.57	.43	28	.91	.09
5	.26	.74	31	.58	.42	Dec. 2	.92	.08
9	.27	.73	Aug. 3	.59	.41	6	.93	.07
12	.28	.72	7	.60	.40	9	.94	.06
16	.29	.71	11	.61	.39	13	.95	.05
20	.30	.70	14	.62	.38	17	.96	.04
23	.31	.69	18	.63	.37	20	.97	.03
27	.32	.68	22	.64	.36	24	.98	.02
			25	.65	.35	28	.99	.01
			29	.66	.34	31	1.00	.00

Thefe Tables are intended for deducing the apparent R. A. and N. P. D. of a Star from its mean pofition; and the figns ± are fet down accordingly. If the mean pofition is to be deduced from an obferved or apparent place, the numbers muft of courfe be applied with a contrary fign.

The mean R. A. and N. P. D. of a Star, being brought up to the day in queftion, by the refpective annual præceffions multiplied by the Tables VIII. and X. its apparent R. A. for that day may be deduced by Tables XI. XII. and XIII. and its apparent N. P. D. by the Tables XIV. XV. XVI. and XVII.

TABLE XI.

For finding the Effect of Aberration on R. A. in Time, for every 10th Day of the Year, and each Hour of the *'s R. A. Thefe Numbers muft be multiplied by the nat. fecant of the *'s Declination.

	☉'s me. Long.	h 0 h 12	h 1 h 13	h 2 h 14	h 3 h 15	h 4 h 16	h 5 h 17	h 6 h 18	h 7 h 19	h 8 h 20	h 9 h 21	h 10 h 22	h 11 h 23	h 12 h 0	R. A. of the *
	s ° ′	″	″	″	″	″	″	″	″	″	″	″	″	″	
Jan. 0	9 9 54	−0.211+	+0.134−	+0.474−	+0.780−	+1.033−	+1.211−	+1.313−	+1.321−	+1.242−	+1.078−	+.837−	+.544−	+.211−	
10	19 45	.414	−.074+	.269	.595	.879	1.105	1.255	1.319	1.293	1.173	.982	.723	.414	
20	29 37	.608	.285	.063	.392	.701	.962	1.158	1.276	1.303	1.246	1.103	.885	.608	
30	10 9 28	.777	.485	−.160+	.178	.503	.793	1.028	1.195	1.280	1.278	1.189	1.020	.777	
Feb. 9	19 20	.928	.672	.369	.041	.289	.599	.868	1.075	1.216	1.270	1.238	1.120	.928	
19	29 11	1.050	.838	.568	−.258+	.068	.388	.681	.932	1.115	1.226	1.255	1.196	1.050	
Mar. 1	11 9 2	1.142	1.079	.749	.470	−.158+	.166	.477	.757	.985	1.148	1.228	1.227	1.142	
11	18 53	1.201	1.093	.912	.668	.378	−.066+	.256	.558	.822	1.030	1.169	1.226	1.201	
21	28 45	1.223	1.173	1.045	.845	.588	.289	.029	.344	.640	.885	1.073	1.188	1.223	
31	0 8 36	1.209	1.220	1.149	.995	.777	.505	−.198+	.123	.432	.715	.948	1.117	1.209	
Apr. 10	18 28	1.160	1.230	1.216	1.123	.946	.708	.422	−.107+	.214	.521	.792	1.010	1.160	
20	28 19	1.074	1.204	1.249	1.208	1.087	.889	.628	.331	−.008+	.314	.616	.875	1.074	
30	1 8 11	0.962	1.143	1.246	1.262	1.196	1.042	.823	.545	.232	.098	.421	.716	.962	
May 1	18 2	.818	1.051	1.204	1.279	1.267	1.169	.991	.745	.449	−.121+	.214	.534	.818	
20	27 53	.648	.919	1.123	1.257	1.298	1.259	1.133	.925	.655	.341	−.003+	.334	.648	
30	2 7 45	.465	.767	1.004	1.199	1.301	1.312	1.237	1.073	.837	.545	.216	.128	.465	
June 9	17 36	.264	.592	.878	1.109	1.259	1.325	1.302	1.186	.995	.734	.420	−.073+	.264	
19	27 28	.053	.396	.708	.980	1.178	1.300	1.331	1.272	1.128	.902	.620	.293	.053	
29	3 7 19	+.155−	.191	.526	.827	1.069	1.239	1.323	1.318	1.225	1.045	.792	.492	−.155+	
July 9	17 10	.361	+.019−	.324	.645	.923	1.141	1.274	1.323	1.283	1.148	.944	.678	.361	
19	27 2	.560	.230	.111	.446	.750	1.003	1.188	1.291	1.306	1.232	1.075	.845	.560	
29	4 6 53	.734	.433	+.101−	.235	.556	.840	1.066	1.223	1.283	1.273	1.169	.986	.734	
Aug. 8	16 45	.891	.624	.315	.016	.345	.651	.913	1.110	1.236	1.275	1.228	1.094	.891	
18	26 36	1.020	.796	.517	+.203−	.126	.444	.734	.973	1.146	1.241	1.255	1.174	1.020	
28	5 6 27	1.122	.945	.704	.417	+.100−	.225	.529	.804	1.022	1.172	1.237	1.222	1.122	
Sept. 7	16 19	1.187	1.065	.871	.617	.321	+.008−	.315	.613	.867	1.065	1.188	1.230	1.187	
17	26 10	1.220	1.156	1.012	.800	.532	.230	.090	.403	.692	.927	1.103	1.202	1.220	
27	6 6 2	1.216	1.212	1.124	.958	.731	.450	+.139−	.181	.487	.762	.984	1.138	1.216	
Oct. 7	15 53	1.177	1.231	1.201	1.094	.904	.657	.365	+.048−	.272	.574	.836	1.042	1.177	
17	25 44	1.101	1.215	1.244	1.189	1.052	.844	.575	.275	.049	.369	.663	.915	1.101	
27	7 5 36	.995	1.161	1.252	1.254	1.168	1.006	.776	.491	+.174−	.155	.473	.760	.995	
Nov. 6	15 27	.858	1.078	1.218	1.278	1.252	1.137	.950	.695	.394	+.066−	.266	.583	.858	
16	25 18	.695	.956	1.136	1.267	1.294	1.239	1.096	.879	.601	.283	.053	.388	.695	
26	8 5 10	.517	.809	1.050	1.217	1.305	1.301	1.207	1.035	.791	.492	+.159−	.184	.517	
Dec. 6	15 1	.317	.639	.918	1.131	1.274	1.325	1.288	1.162	.957	.686	.370	+.024−	.317	
16	24 53	.110	.450	.756	1.017	1.202	1.312	1.328	1.254	1.095	.860	.569	.227	.110	
26	9 4 44	−.100+	.246	.577	.868	1.100	1.257	1.329	1.310	1.198	1.010	.748	.440	+.100−	
31	9 40	.205	.139	.479	.784	1.036	1.214	1.314	1.322	1.241	1.075	.833	.538	.205	

Table XII.

For finding the Effect of Nutation in R. A. in Time for every 10° of ☽'s ☊, and each Hour of ☼'s R. A.
These Numbers must be multiplied by the Natural Tangent of the ☼'s Declination, which will be Negative, if the Declination be South.

S °	h 0 h 12	h 1 h 13	h 2 h 14	h 3 h 15	h 4 h 16	h 5 h 17	h 6 h 18	h 7 h 19	h 8 h 20	h 9 h 21	h 10 h 22	h 11 h 23
	"	"	"	"	"	"	"	"	"	"	"	"
O. 0	−0.600+	−0.578+	−0.520+	−0.424+	−0.301+	−0.155+	0.000	+0.155−	+0.301−	+0.424−	+0.520−	+0.578−
10	.590	.589	.551	.473	.363	.228	− .078+	.078	.228	.363	.473	.551
20	.564	.583	.564	.507	.414	.293	.153	− .001+	.150	.290	.411	.506
I. 0	.520	.559	.562	.525	.453	.350	.223	.081	.067	.208	.339	.443
10	.460	.518	.541	.527	.479	.396	.287	.158	−0.019+	.122	.254	.369
20	.385	.462	.505	.513	.489	.430	.342	.231	.104	.032	.163	.285
II. 0	.301	.390	.453	.485	.484	.451	.386	.297	.185	− .062+	.067	.189
10	.205	.307	.388	.441	4.66	.457	.420	.352	.261	.152	− .032+	.089
20	.104	.214	.310	.385	.433	.451	.440	.397	.329	.237	.130	− .012+
III. 0	.000	.115	.223	.316	.386	.432	.446	.432	.386	.316	.223	.115
10	+ .104−	.012	.130	.237	.329	.397	.440	.451	.433	.385	.310	.214
20	.205	+ .089	.032	.152	.261	.352	.420	.457	.466	.441	.388	.307
IV. 0	.301	.189	+ .067−	0 62	.185	.297	.386	.451	.484	.485	.453	.390
10	.385	.285	.163	+ .032−	.104	.231	.342	.430	.489	.513	.505	.462
20	.460	.369	.254	.122	.019	.158	.287	.396	.479	.527	.541	.518
V. 0	.520	.443	.339	.208	+ .067−	.081	.223	.350	.453	.525	.562	.559
10	.564	.506	.411	.290	.150	.001	.153	.293	.414	.507	.564	.583
20	.590	.551	.473	.363	.228	+ .078−	.078	.228	.363	.473	.551	.589
VI. 0	.600	.578	.520	.424	.301	.155	.000	.155	.301	.424	.520	.578
10	.590	.589	.551	.473	.363	.228	+ .078−	.078	.228	.363	.473	.551
20	.564	.583	.564	.507	.414	.293	.153	+ .001−	.150	.290	.411	.506
VII. 0	.520	.559	.562	.525	.453	.350	.223	.021	.067	.208	.339	.443
10	.460	.518	.541	.527	.479	.396	.287	.158	+ .019−	.122	.254	.369
20	.385	.462	.505	.513	.489	.430	.342	.231	.104	.032	.163	.285
VIII. 0	.301	.390	.453	.485	.484	.451	.386	.297	.185	+ .062−	.067	.189
10	.205	.307	.388	.441	.466	.457	.420	.352	.261	.152	+ .032−	.089
20	.104	.214	.310	.385	.433	.451	.440	.297	.329	.237	.130	+ .012−
IX. 0	.000	.115	.223	.316	.386	.432	.446	.432	.386	.316	.223	.115
10	− .104+	.012	.130	.237	.329	.397	.440	.451	.433	.385	.310	.214
20	.205	− .089+	.032	.152	261	.352	.420	.457	.466	.441	.388	.307
X. 0	.301	.189	− .067+	.062	.185	.297	.386	.451	.484	.485	.453	.390
10	.385	.285	.163	− .032+	.104	.231	.342	.430	.489	.513	.505	.462
20	.460	.369	.254	.122	.019	.158	.287	.396	.479	.527	.541	.518
0	.520	.443	.339	.208	− .067+	.081	.223	.350	.453	.525	.562	.559
10	.564	.506	.411	.290	.150	.001	.153	.293	.414	.507	.564	.583
20	.590	.551	.473	.363	.228	− .078+	.078	.228	.363	.473	.551	.589

Table XIII.

The Equation of the Equinoxes in R. A. in Time.
Argument. Long. of ☽'s ☊

S	0 − 6 +	1 − 7 +	2 − 8 +	S
°	"	"	"	°
0	0.00	0.55	0.95	30
1	.02	.56	.95	29
2	.04	.58	.96	28
3	.06	.59	.97	27
4	.08	.61	.98	26
5	.10	.63	.99	25
6	.11	.64	1.00	24
7	.13	.66	1.00	23
8	.15	.67	1.01	22
9	.17	.69	1.02	21
10	.19	.70	1.03	20
11	.21	.72	1.03	19
12	.23	.73	1.04	18
13	.25	.74	1.04	17
14	.26	.76	1.05	16
15	.28	.77	1.05	15
16	.30	.79	1.06	14
17	.32	.80	1.06	13
18	.34	.81	1.07	12
19	.36	.82	1.07	11
20	.37	.84	1.08	10
21	.39	.85	1.08	9
22	.41	.86	1.08	8
23	.43	.87	1.08	7
24	.44	.88	1.09	6
25	.46	.89	1.09	5
26	.48	.90	1.09	4
27	.50	.92	1.09	3
28	.51	.93	1.09	2
29	.53	.94	1.09	1
30	.55	.95	1.09	0
S	5 − 11 +	4 − 10 +	3 − 9 +	S

Table XIV.

For finding the Effect of Aberration on N. P. D. for every 10th Day, and each Hour of R. A. of the ✳.
These Numbers must be multiplied by the nat. sine of the ✳'s Declination. If the ✳ be south, the ± must be changed.

	☉'s me. Long.	h h 0 12	h h 1 13	h h 2 14	h h 3 15	h h 4 16	h h 5 17	h h 6 18	h h 7 19	h h 8 20	h h 9 21	h h 10 22	h h 11 23	h h 12 0	R. A. of the ✳
	s ° ′	″	″	″	″	″	″	″	″	″	″	″	″	″	
Jan. 0	9 9 54	−19.71+	−19.85+	−18.64+	−16.17+	−12.57+	− 8.14+	− 3.16+	+ 2.05−	+ 7.13−	+11.70−	+15.48−	+18.22−	+19.71−	
10	19 45	18.82	19.78	19.40	17.69	14.78	10.86	6.20	− 1.11−	4.04	8.92	13.18	16.58	18.82	
20	29 37	17.39	19.21	19.59	18.70	16.54	13.25	9.07	4.26	0.85	5.89	10.53	14.47	17.39	
30	10 9 28	15.44	17.94	19.20	19.17	17.83	15.27	11.67	7.29	− 2.35+	2.65	7.54	11.89	15.44	
Feb. 9	19 20	13.03	16.19	18.24	19.06	18.57	16.81	13.92	10.05	5.52	− 0.63+	4.33	8.98	13.03	
19	29 11	10.25	13.96	16.76	18.37	18.77	17.88	15.75	12.56	8.53	3.89	0.99	5.81	10.25	
Mar. 1	11 9 2	7.15	11.35	14.77	17.19	18.42	18.40	17.13	14.70	11.26	7.06	− 2.37+	2.48	7.15	
11	18 53	3.85	8.38	12.34	15.45	17.53	18.39	17.99	16.40	13.67	10.01	5.66	− 0.93+	3.85	
21	28 45	0.43	5.16	9.54	13.28	16.10	17.82	18.34	17.60	17.68	12.67	8.80	4.35	0.43	
31	0 8 36	+ 3.00−	1.80	6.47	10.71	14.21	16.75	18.14	18.30	17.21	14.93	11.65	7.58	− 3.00+	
Apr. 10	18 28	6.34	+ 1.60−	3.23	7.82	11.89	15.17	17.39	18.45	18.23	16.77	14.20	10.62	6.34	
20	28 19	9.49	4.98	+ 0.14−	4.69	9.25	13.12	16.15	18.06	18.72	18.12	16.28	13.35	9.49	
30	1 8 11	12.36	8.21	3.49	1.43	6.31	10.73	14.42	17.13	18.68	18.94	17.91	15.67	12.36	
May 10	18 2	14.86	11.18	6.75	+ 1.83−	3.19	8.01	12.28	15.70	18.06	19.20	19.00	17.53	14.86	
20	27 53	16.93	13.84	9.79	5.07	+ 0.02−	5.05	9.75	13.81	16.92	18.88	19.55	18.88	16.93	
30	2 7 45	18.51	16.08	12.55	8.18	3.24	1.91	6.96	11.49	15.27	18.00	19.51	19.67	18.51	
June 9	17 36	19.54	17.84	14.94	11.01	6.36	+ 1.25−	3.95	8.86	13.18	16.60	18.88	19.89	19.54	
19	27 28	19.97	19.10	16.91	13.56	9.29	4.40	0.81	5.96	10.69	14.69	17.70	19.51	19.97	
29	3 7 19	19.84	19.76	18.35	15.69	11.94	7.40	+ 2.35−	2.86	7.89	12.38	16.01	18.56	19.84	
July 9	17 10	19.11	19.86	19.25	17.35	14.25	10.18	5.42	+ 0.28−	4.85	9.68	13.85	17.05	19.11	
19	27 2	17.82	19.36	19.60	18.[illegible]8	16.13	12.66	8.32	3.45	1.68	6.71	11.26	15.07	17.82	
29	4 6 53	16.00	18.31	19.35	19.10	17.55	14.80	11.01	6.51	+ 1.54−	3.53	8.35	12.58	16.00	
Aug. 8	16 45	13.70	16.69	18.54	19.13	18.42	16.45	13.36	9.36	4.72	0.23	5.19	9.77	13.70	
18	26 36	11.00	14.60	17.21	18.62	18.76	17.64	15.31	11.92	7.76	+ 3.04−	1.86	6.66	11.00	
28	5 6 27	7.99	12.07	15.33	17.55	18.56	18.32	16.83	14.18	10.58	6.25	+ 1.49−	3.36	7.99	
Sept. 7	16 19	4.72	9.18	13.01	15.95	17.81	18.45	17.85	16.05	13.05	9.25	4.81	+ 0.04−	4.72	
17	26 10	1.35	6.04	10.31	13.90	16.52	18.02	18.31	17.33	15.17	12.00	7.99	3.45	1.35	
27	6 6 1	− 2.09+	2.71	7.31	11.43	14.76	17.08	18.25	18.17	16.85	14.38	10.94	6.75	+ 2.09−	
Oct. 7	15 53	5.47	− 0.72+	4.09	8.61	12.54	15.62	17.64	18.46	18.02	16.35	13.57	9.86	5.47	
17	25 44	8.69	4.12	0.74	5.65	9.98	13.72	16.53	18.22	18.67	17.84	15.81	12.66	8.69	
27	7 5 36	11.64	7.39	− 2.62+	2.32	7.10	11.41	14.92	17.43	18.75	18.80	17.55	15.09	11.64	
Nov. 6	15 27	14.25	10.45	5.92	− 0.99−	4.06	8.73	12.87	16.11	18.27	19.18	18.78	17.10	14.25	
16	25 18	16.44	13.18	9.02	4.26	0.81	5.83	10.43	14.33	17.26	19.00	19.44	18.59	16.44	
26	8 5 10	18.15	15.53	11.87	7.36	− 2.61+	2.74	7.70	11.97	15.74	18.28	19.58	19.52	18.15	
Dec. 6	15 1	19.33	17.43	14.37	10.31	5.54	− 0.41+	4.74	9.59	13.78	17.01	19.10	19.89	19.33	
16	24 53	19.92	18.83	16.43	12.92	8.55	3.57	1.64	6.73	11.38	15.25	18.06	19.66	19.92	
26	9 4 44	19.93	19.64	18.01	15.16	11.28	6.62	− 1.51+	3.70	8.66	13.03	16.52	18.88	19.93	
31	9 40	19.73	19.84	18.61	16.12	12.52	7.99	3.08	2.13	7.20	11.76	15.53	18.25	19.73	

TABLE

Table XV.

For finding the farther Effect of Aberration on the N.P.D. of a Star for every 10th Day, and every 10° of Star's Decl.

Argument. ☉'s Long. ± Star's Decl.

	⁎'s Decl. 0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
	″	″	″	″	″	″	″	″	″	″
Jan. 0	+1.37	+1.35	+1.28	+1.18	+1.04	+0.87	+0.68	+0.46	+0.23	0.00
10	2.69	2.65	2.53	2.33	2.06	1.74	1.35	.92	.46	
20	3.94	3.88	3.70	3.41	3.02	2.53	1.97	1.34	.67	
30	5.07	4.99	4.77	4.39	3.88	3.25	2.54	1.73	.86	
Feb. 9	6.05	5.95	5.69	5.24	4.64	3.88	3.03	2.06	1.03	
19	6.85	6.74	6.44	5.92	5.24	4.40	3.43	2.33	1.17	
Mar. 1	7.44	7.32	6.99	6.43	5.69	4.77	3.72	2.54	1.28	
11	7.82	7.70	7.35	6.77	5.99	5.01	3.91	2.67	1.34	
21	7.96	7.84	7.48	6.89	6.10	5.11	3.98	2.71	1.37	0.00
31	7.87	7.75	7.41	6.81	6.02	5.06	3.94	2.69	1.35	
Apr. 10	7.56	7.44	7.11	6.55	5.79	4.88	3.78	2.58	1.30	
20	7.02	6.90	6.60	6.08	5.38	4.53	3.51	2.40	1.21	
30	6.26	6.16	5.88	5.42	4.79	4.01	3.13	2.14	1.08	
May 10	5.34	5.26	5.02	4.62	4.08	3.43	2.67	1.83	.92	
20	4.23	4.16	3.97	3.66	3.24	2.71	2.12	1.45	.73	
30	3.01	2.96	2.83	2.60	2.30	1.94	1.51	1.03	.52	
June 9	1.72	1.69	1.61	1.48	1.31	1.09	.86	.59	.30	
19	0.35	0.34	0.33	.30	.27	.22	.17	.12	.06	0.00
29	−1.02	−1.00	−0.95	− .89	− .78	− .65	− .51	− .35	− .17	0.00
July 9	2.36	2.32	2.22	2.04	1.80	1.51	1.18	.81	.41	
19	3.62	3.56	3.40	3.13	2.77	2.32	1.81	1.23	.63	
29	4.78	4.70	4.49	4.14	3.66	3.07	2.39	1.64	.83	
Aug. 8	5.81	5.72	5.46	5.03	4.45	3.73	2.91	1.98	1.00	
18	6.64	6.54	6.24	5.75	5.08	4.26	3.32	2.27	1.14	
28	7.31	7.20	6.87	6.32	5.59	4.70	3.60	2.50	1.26	
Sept. 7	7.75	7.63	7.28	6.71	5.93	4.99	3.88	2.66	1.35	
17	7.94	7.82	7.46	6.87	6.08	5.11	3.97	2.72	1.38	0.00
27	7.92	7.80	7.44	6.85	6.06	5.09	3.96	2.71	1.37	
Oct. 7	7.66	7.54	7.20	6.63	5.86	4.92	3.83	2.62	1.33	
17	7.18	7.07	6.75	6.21	5.49	4.60	3.59	2.45	1.25	
27	6.47	6.37	6.08	5.60	4.95	4.16	3.24	2.21	1.12	
Nov. 6	5.60	5.51	5.26	4.85	4.29	3.59	2.80	1.91	.97	
16	4.53	4.46	4.25	3.91	3.46	2.89	2.26	1.54	.78	
26	3.34	3.29	3.14	2.89	2.56	2.15	1.67	1.14	.58	
Dec. 6	2.06	2.02	1.93	1.78	1.58	1.32	1.03	0.71	.36	
16	0.72	0.71	0.67	.62	.55	.46	.36	.25	.12	
26	+0.66	+0.65	+0.62	+ .57	− .50	+ .42	+ .33	+ .22	+ .11	0.00
31	1.34	1.32	1.26	1.16	1.02	.86	.67	.46	.23	

TABLE XVI.

For finding the Semiannual Solar Equation in N.P.D. for every 10th Day, and every Hour of R.A. of the Star.

	☉ Long. × 2	h 0 h 12	h 1 h 13	h 2 h 14	h 3 h 15	h 4 h 16	h 5 h 17	h 6 h 18	h 7 h 19	h 8 h 20	h 9 h 21	h 10 h 22	h 11 h 23	h 12 h 0	R.A. of the *
	s. ° ′	″	″	″	″	″	″	″	″	″	″	″	″	″	
Jan. 0.	6 19 48	−0.16+	−0.04+	+0.08−	+0.20−	+0.31−	+0.40−	+0.45−	+0.48−	+0.47−	+0.43−	+0.37−	+0.27−	+0.16−	
10.	7 9 30	.31	.20	− .08+	.04	.16	.27	.37	.43	.47	.48	.45	.40	.31	
20.	29 14	.42	.34	.24	− .12+	.00	.12	.24	.34	.42	.46	.48	.46	.42	
30.	8 18 56	.47	.43	.37	.27	− .16+	− .04+	.08	.20	.41	.40	.45	.48	.47	
Feb. 9.	9 8 40	.47	.48	.45	.40	.31	.20	− .08+	.04	.16	.27	.37	.43	.47	
19.	22 22	.42	.46	.48	.46	.42	.34	.24	− .12+	.00	.12	.24	.34	.42	
Mar. 1.	10 18 4	.32	.41	.45	.48	.47	.42	.36	.25	− .15+	− .03+	.09	.23	.31	
11.	11 7 46	.18	.30	.39	.44	.48	.47	.44	.38	.29	.18	− .06+	.06	.18	
21.	27 30	.02	.14	.26	.36	.43	.47	.48	.45	.41	.32	.22	− .10+	.03	
31.	0 17 12	+ .14−	+ .01−	.11	.23	.33	41	.46	.48	.46	.42	.35	.25	− .14+	
Apr. 10.	1 6 56	.28	.17	+ .05−	.07	.19	− .30	.39	.45	.48	.47	.44	.38	.28	
20.	26 38	.40	.31	.21	+ .08−	.03	.16	.26	.37	.43	.47	.48	.45	.40	
30.	2 16 22	.46	.42	.34	.24	+ .13−	.00	.11	.24	.34	.42	.46	.48	.46	
May 10.	3 6 4	.48	.47	.43	.37	.27	+ .16−	+ .05−	.08	.19	.31	.40	.45	.48	
20.	25 46	.43	.47	.48	.45	.40	.31	.20	+ .08−	.04	.16	.27	.37	.43	
30.	4 15 30	.34	.42	.46	.48	.46	.42	.34	.24	+ .12−	.00	.12	.24	.34	
June 9.	5 5 12	.20	.31	.40	.45	.48	.47	.43	.37	.27	+ .16−	+ .04−	.08	.20	
19.	24 56	.04	.16	.27	.37	.43	.47	.48	.45	.40	.31	.20	+ .08−	.04	
29.	6 14 38	− .12+	.00	.12	.24	.34	.42	.46	.48	.46	.42	.34	.24	+ .12−	
July 9.	7 4 20	.27	− .15+	− .03+	.09	.19	.31	.40	.45	.48	.47	.43	.37	.27	
19.	24 4	.40	.30	.20	− .07+	.04	.16	.28	.37	.43	.47	.48	.45	.40	
29.	8 13 46	.46	.42	.33	.23	− .11+	.01	.13	.24	.34	.42	.46	.48	.46	
Aug. 8.	9 3 30	.48	.47	.43	.36	.26	− .15+	− .03+	.09	.22	.34	.41	.45	.47	
18.	23 12	.44	.47	.48	.44	.39	.29	.18	− .07+	.05	.17	.28	.38	.44	
28.	10 12 54	.35	.42	.46	.48	.46	.42	.33	.23	− .11+	.01	.14	.25	.35	
Sept. 7.	11 2 38	.22	.32	.41	.45	.48	.47	.42	.36	.26	− .15+	− .03+	.09	.21	
17.	22 20	.06	.18	.30	.39	.44	.48	.47	.44	.38	.29	.18	− .06+	.06	
27.	0 12 2	+ .10−	.02	.14	.26	.36	.43	.47	.48	.45	.41	.32	.22	− .10+	
Oct. 7.	1 1 46	.25	+ .13−	+ .01−	.11	.23	.33	.42	.46	.48	.46	.42	.35	.25	
17.	21 28	.37	.27	.16	+ .04−	.08	.20	.31	.40	.45	.48	.47	.43	.37	
27.	2 11 12	.45	.40	.31	.20	+ .08−	.04	.16	.27	.37	.43	.47	.48	.45	
Nov. 6.	3 0 54	.48	.46	.42	.34	.24	+ .12−	.00	.12	.24	.34	.42	.46	.48	
16.	20 36	.45	.48	.47	.43	.37	.27	+ .16−	+ .04−	.08	.20	.31	.40	.45	
26.	4 10 20	.37	.43	.47	.48	.45	.40	.31	.20	+ .08−	.04	.16	.27	.37	
Dec. 6.	5 0 2	.24	.34	.42	.46	.48	.46	.42	.34	.24	+ .12−	.00	.12	.24	
16.	19 46	.08	.20	.31	.40	.45	.48	.47	.43	.37	.27	+ .16−	+ .04−	.08	
26.	6 9 28	− .08+	.04	.16	.27	.37	.43	.47	.48	.45	.40	.31	.20	+ .08−	
31.	19 20	.16	− .04+	.08	.20	.31	.40	.45	.48	.47	.43	.37	.27	.16	

TABLE XVII.

For finding the Effect of Nutation on the N.P.D. for every 10° of ☽'s ☊ and every Hour of *'s R.A.

Arg. Long. of ☽ ☊	h h 0 12	h h 1 13	h h 2 14	h h 3 15	h h 4 16	h h 5 17	h h 6 18	h h 7 19	h h 8 20	h h 9 21	h h 10 22	h h 11 23	h h 12 0
° s	"	"	"	"	"	"	"	"	"	"	"	"	"
O. 0	0.00	−2.33 +	−4.51 +	−6.36 +	−7.80 +	−8.69 +	−9.00 +	−8.69 +	−7.80 +	−6.36 +	−4.51 +	−2.33 +	0.00
10	+1.16 −	1.17	3.42	5.44	7.09	8.26	8.86	8.84	8.26	7.09	5.44	3.42	−1.16 +
20	2.29	+0.02 −	2.24	4.36	6.18	7.58	8.46	8.74	8.47	7.60	6.21	4.40	2.29
I. 0	3.35	1.22	1.00	3.14	5.08	6.66	7.80	8.39	8.43	7.88	6.80	5.25	3.35
10	4.31	2.38	+0.28 −	1.83	3.81	5.54	6.89	7.77	8.12	7.90	7.18	5.94	4.31
20	5.13	3.46	1.55	0.47	2.44	4.26	5.79	6.92	7.58	7.70	7.34	6.45	5.13
II. 0	5.80	4.44	2.78	+0.92 −	1.00	2.84	4.51	5.85	6.80	7.28	7.27	6.77	5.80
10	6.30	5.28	3.92	2.28	+0.48 −	1.34	3.07	4.60	5.81	6.62	6.99	6.86	6.30
20	6.60	5.96	4.93	3.56	1.94	+0.19 −	1.56	3.22	4.66	5.77	6.50	6.76	6.60
III. 0	6.70	6.47	5.80	4.74	3.35	1.73	0.00	1.73	3.35	4.74	5.80	6.47	6.70
10	6.60	6.76	6.50	5.77	4.66	3.22	+1.56 −	0.19	1.94	3.56	4.93	5.96	6.60
20	6.30	6.86	6.99	6.62	5.81	4.60	3.07	+1.34 −	0.48	2.28	3.92	5.28	6.30
IV. 0	5.80	6.77	7.27	7.28	6.80	5.85	4.51	2.84	+1.00 −	0.92	2.78	4.44	5.80
10	5.13	6.45	7.34	7.70	7.58	6.92	5.79	4.26	2.44	+0.47 −	1.55	3.46	5.13
20	4.31	5.94	7.18	7.90	8.12	7.77	6.89	5.54	3.81	1.83	0.28	2.38	4.31
V. 0	3.35	5.25	6.80	7.88	8.43	8.39	7.80	6.66	5.08	3.14	+1.00 −	1.22	3.35
10	2.29	4.40	6.21	7.60	8.47	8.74	8.46	7.58	6.18	4.36	2.24	0.02	2.29
20	1.16	3.42	5.44	7.09	8.26	8.84	8.86	8.26	7.09	5.44	3.42	+1.17 −	1.16
VI. 0	0.00	2.33	4.51	6.36	7.80	8.69	9.00	8.69	7.80	6.36	4.51	2.33	0.00
10	−1.16 +	1.17	3.42	5.44	7.09	8.26	8.86	8.84	8.26	7.09	5.44	3.42	+1.16 −
20	2.29	−0.02 +	2.24	4.36	6.18	7.58	8.46	8.74	8.47	7.60	6.21	4.40	2.29
VII. 0	3.35	1.22	1.00	3.14	5.08	6.66	7.80	8.39	8.43	7.88	6.80	5.25	3.35
10	4.31	2.38	−0.28 +	1.83	3.81	5.54	6.89	7.77	8.12	7.90	7.18	5.94	4.31
20	5.13	3.46	1.55	0.47	2.44	4.26	5.79	6.92	7.58	7.70	7.34	6.45	5.13
VIII. 0	5.80	4.44	2.78	−0.92 +	1.00	2.84	4.51	5.85	6.80	7.28	7.27	6.77	5.80
10	6.30	5.28	3.92	2.28	−0.48 +	1.34	3.07	4.60	5.81	6.62	6.99	6.86	6.30
20	6.60	5.96	4.93	3.56	1.94	−0.19 +	1.56	3.22	4.66	5.77	6.50	6.76	6.60
IX. 0	6.70	6.47	5.80	4.74	3.35	1.73	0.00	1.73	3.35	4.74	5.80	6.47	6.70
10	6.60	6.76	6.50	5.77	4.66	3.22	−1.56 +	0.19	1.94	3.56	4.93	5.96	6.60
20	6.30	6.86	6.99	6.62	5.81	4.60	3.07	−1.34 +	0.48	2.28	3.92	5.28	6.30
X. 0	5.80	6.77	7.27	7.28	6.80	5.85	4.51	2.84	−1.00 +	0.92	2.78	4.44	5.80
10	5.13	6.45	7.34	7.70	7.58	6.92	5.79	4.26	2.44	−0.47 +	1.55	3.46	5.13
20	4.31	5.94	7.18	7.90	8.12	7.77	6.89	5.54	3.81	1.83	0.28	2.38	4.31
XI. 0	3.35	5.25	6.80	7.88	8.43	8.39	7.80	6.66	5.08	3.14	−1.00 +	1.22	3.35
10	2.29	4.40	6.21	7.60	8.47	8.74	8.46	7.58	6.18	4.36	2.24	0.02	2.29
20	1.16	3.42	5.44	7.09	8.26	8.84	8.86	8.26	7.09	5.44	3.42	−1.17 +	1.16

Table XVIII.

A Table of mean Refractions to every Ten Minutes of Zenith Distances.

App. Z. D.	Refraction.	Dif.	App. Z. D.	Refraction.	Dif.	App. Z. D.	Refraction.	Dif.	App. Z. D.	Refraction.	Dif.	App. Z. D.	Refraction.	Dif.
° ′	″	″	° ′	″	″	° ′	″	″	° ′	″	″	° ′	″	″
0 0	0.00	.17	9 00	9.00	.17	18 00	18.50	.18	27 00	29.00	.22	36 00	41.40	.25
0 10	0.17	.16	9 10	9.17	.16	18 10	18.68	.19	27 10	29.22	.21	36 10	41.65	.25
0 20	0.33	.17	9 20	9.33	.17	18 20	18.87	.18	27 20	29.43	.22	36 20	41.90	.25
0 30	0.50	.17	9 30	9.50	.17	18 30	19.05	18	27 30	29.65	.22	36 30	42.15	.25
0 40	0.67	.16	9 40	9.67	.16	18 40	19.23	.19	27 40	29.87	.21	36 40	42 40	.25
0 50	0.83	.17	9 50	9.83	17	18 50	19.42	.18	27 50	30.08	.22	36 50	42.65	25
1 0	1.00	.17	10 00	10.00	.18	19 00	19.60	.18	28 00	30.30	.22	37 00	42.90	.27
1 10	1.17	.16	10 10	10.18	.19	19 10	19.78	.19	28 10	30.52	.21	37 10	43.17	.26
1 20	1.33	.17	10 20	10.37	.18	19 20	19.97	18	28 20	30.73	.22	37 20	43.43	.27
1 30	1.50	.17	10 30	10.55	.18	19 30	20.15	.18	28 30	30.95	.22	37 30	43 70	.27
1 40	1.67	.16	10 40	10.73	.19	19 40	20.33	.19	28 40	31.17	.21	37 40	43.97	.26
1 50	1.83	.17	10 50	10.92	.18	19 50	20.52	.18	28 50	31.38	22	37 50	44.23	.27
2 0	2.00	.17	11 00	11.10	.17	20 00	20.70	.20	29 00	31.60	.22	38 00	44.50	.27
2 10	2.17	.16	11 10	11.27	.16	20 10	20.90	20	29 10	31.82	.21	38 10	44.77	.26
2 20	2.33	.17	11 20	11.43	.17	20 20	21.10	.20	29 20	32.03	.22	38 20	45.03	.27
2 30	2.50	.17	11 30	11.60	.17	20 30	21.30	.20	29 30	32.25	.22	38 30	45.30	.27
2 40	2 67	.16	11 40	11.77	16	20 40	21.50	.20	29 40	32.47	.21	38 40	45.57	.26
2 50	2.83	.17	11 50	11.93	.17	20 50	21.70	.20	29 50	32.68	.22	38 50	45.83	.27
3 0	3 00	.17	12 00	12.10	.17	21 00	21.90	18	30 00	32.90	.22	39 00	46.10	.28
3 10	3.17	.16	12 10	12.27	.16	21 10	22.08	.19	30 10	33.12	.21	39 10	46.38	.29
3 20	3.33	.17	12 20	12.43	.17	21 20	22.27	.18	30 20	33 33	.22	39 20	46.67	.28
3 30	3.50	.17	12 30	12.60	.17	21 30	22.45	.18	30 30	33.55	.22	39 30	46.95	.28
3 40	3.67	.16	12 40	12 77	16	21 40	22.63	.19	30 40	33.77	.21	39 40	47.23	.29
3 50	3.83	.17	12 50	12.93	.17	21 50	22.82	.18	30 50	33.98	.22	39 50	47.52	.28
4 0	4.00	.17	13 00	13.10	18	22 00	23.00	.20	31 00	34.20	.23	40 00	47.80	.28
4 10	4.17	.16	13 10	13.28	.19	22 10	23.20	.20	31 10	34.43	.24	40 10	48.08	.29
4 20	4.33	.17	13 20	13.47	.18	22 20	23.40	.20	31 20	34.67	.23	40 20	48.37	.28
4 30	4.50	.17	13 30	13.65	.18	22 30	23.60	.20	31 30	34.90	.23	40 30	48 65	.28
4 40	4.67	.16	13 40	13.83	.19	22 40	23.80	.20	31 40	35.13	.24	40 40	48.93	.29
4 50	4.83	.17	13 50	14.02	.18	22 50	24.00	.20	31 50	35.37	.23	40 50	49 22	.28
5 0	5.00	.17	14 00	14.20	.18	23 00	24.20	.20	32 00	35 60	.23	41 00	49.50	.30
5 10	5.17	.16	14 10	14.38	.19	23 10	24.40	.20	32 10	35.83	.24	41 10	49.80	.30
5 20	5.33	.17	14 20	14.57	.18	23 20	24.60	.20	32 20	36.07	.23	41 20	50 10	.30
5 30	5.50	.17	14 30	14.75	18	23 30	24.80	.20	32 30	36.30	.23	41 30	50.40	.30
5 40	5.67	.16	14 40	14 93	.19	23 40	25.00	.20	32 40	36.53	.24	41 40	50.70	.30
5 50	5.83	.17	14 50	15.12	.18	23 50	25.20	20	32 50	36.77	.23	41 50	51.00	.30
6 0	6.00	.17	15 00	15.30	.17	24 00	25.40	.20	33 00	37.00	.23	42 00	51.30	.30
6 10	6.17	.16	15 10	15.47	.16	24 10	25.60	.20	33 10	37.23	.24	42 10	51.60	.30
6 20	6.33	.17	15 20	15.63	.17	24 20	25.80	.20	33 20	37.47	.23	42 20	51.90	.30
6 30	6.50	.17	15 30	15.80	.17	24 30	26.00	.20	33 30	37.70	.23	42 30	52.20	30
6 40	6.67	.16	15 40	15.97	.16	24 40	26.20	.20	33 40	37.93	23	42 40	52.50	.30
6 50	6.83	.17	15 50	16.13	.17	24 50	26.40	20	33 50	38.16	.24	42 50	52.80	30
7 0	7.00	.17	16 00	16.30	.18	25 00	26.60	.20	34 00	38.40	25	43 00	53.10	32
7 10	7.17	16	16 10	16.48	.19	25 10	26.80	.20	34 10	38.65	.25	43 10	52.42	.31
7 20	7.33	.17	16 20	16.67	.18	25 20	27.00	.20	34 20	38.90	.25	43 20	53.73	.32
7 30	7.50	17	16 30	16.85	.18	25 30	27.20	.20	34 30	39.15	.25	43 30	54.05	.32
7 40	7.67	.16	16 40	17.03	.19	25 40	27.40	20	34 40	39.40	.25	43 40	54.37	.31
7 50	7.83	.17	16 50	17.22	.18	25 50	27.60	.20	34 50	39.65	.25	43 50	54.68	.32
8 0	8.00	17	17 00	17.40	.18	26 00	27.80	.20	35 00	39.90	.25	44 00	55.00	.32
8 10	8.17	.16	17 10	17.58	.19	26 10	28 00	20	35 10	40.15	.25	44 10	55.32	.31
8 20	8.33	.17	17 20	17.77	.18	26 20	28.20	.20	35 20	40.40	.25	44 20	55.63	.32
8 30	8.50	.17	17 30	17.95	.18	26 30	28.40	.20	35 30	40.65	.25	44 30	55.95	.32
8 40	8.67	16	17 40	18.13	.19	26 40	28.60	.20	35 40	40.90	.25	44 40	56.27	.31
8 50	8.83	.17	17 50	18.32	.18	26 50	28.80	.20	35 50	41.15	.25	44 50	56.58	.32

TABLE XVIII.—*continued.*

A Table of mean Refractions to every Ten Minutes of Zenith Distances.

App. Z. D.	Refraction.	Dif.	App. Z. D.	Refractions.	Dif.	App. Z. D.	Refraction.	Dif.	App. Z. D.	Refraction.	Dif.	App. Z. D.	Refraction.	Dif.
° ′	′ ″	″	° ′	′ ″	″	° ″	′ ″	″	° ′	′ ″	″	° ′	′ ″	″
45 00	0 56.90	33	53 30	1 16.89	.47	62 00	1 46.80	0.76	70 30	2 39.80	1.48	79 00	4 46.35	4.33
45 10	0 57.23	.33	53 40	1 17 36	.47	62 10	1 47.56	0.77	70 40	2 41.28	1.50	79 10	4 51.18	4.45
45 20	0 57.56	.33	53 50	1 17.83	.47	62 20	1 48.33	0.78	70 50	2 42.78	1.52	79 20	4 55.63	4.58
45 30	0 57.89	.33	54 00	1 18.30	.47	62 30	1 49.11	0.79	71 00	2 44.30	1.53	79 30	5 0.21	4.72
45 40	0 58.22	.34	54 10	1 18.77	.48	62 40	1 49.90	0.80	71 10	2 45.83	1.56	79 40	5 4.93	4.88
45 50	0 58.56	.34	54 20	1 19.25	.48	62 50	1 50.70	0.80	71 20	2 47.39	1.58	79 50	5 9.81	5.02
46 00	0 58.90	.35	54 30	1 19.73	.49	63 00	1 51.50	0.80	71 30	2 48.97	1.62	80 00	5 14.33	5.16
46 10	0 59.25	.34	54 40	1 20.22	.49	63 10	1 52.30	0.80	71 40	2 50.59	1.64	80 10	5 19.99	5.32
46 20	0 59.59	.35	54 50	1 20.71	.49	63 20	1 53.10	0.81	71 50	2 52.23	1.67	80 20	5 25.31	5.50
46 30	0 59.94	35	55 00	1 21.20	.51	63 30	1 53.91	0.82	72 00	2 53.90	1.72	80 30	5 30.81	5.68
46 40	1 0 29	.36	55 10	1 21.71	.51	63 40	1 54.73	0.83	72 10	2 55.62	1.75	80 40	5 36.49	5.89
46 50	1 0.65	.35	55 20	1 22.22	.51	63 50	1 55.56	0.84	72 20	2 57.37	1.78	80 50	5 42 38	6.07
47 00	1 1.00	.36	55 30	1 22.73	.52	64 00	1 56.40	0.85	72 30	2 59.15	1.82	81 00	5 48.45	6.25
47 10	1 1.36	.37	55 40	1 23.25	.52	64 10	1 57.25	0.87	72 40	3 0.97	1.85	81 10	5 54.70	6.47
47 20	1 1.73	.36	55 50	1 23.77	.53	64 20	1 58.12	0.88	72 50	3 2.82	1.88	81 20	6 1.17	6.71
47 30	1 2.09	.37	56 00	1 24.30	.52	64 30	1 59.00	0.89	73 00	3 4.70	1.91	81 30	6 7.88	6.95
47 40	1 2.46	.37	56 10	1 24.82	.52	64 40	1 59.89	0.90	73 10	3 6.61	1.94	81 40	6 14.83	7.22
47 50	1 2.83	.37	56 20	1 25.34	.53	64 50	2 0.79	0.91	73 20	3 8 55	1.98	81 50	6 22.05	7.50
48 00	1 3.20	.36	56 30	1 25.87	.54	65 00	2 1.70	0.92	73 30	3 10.53	2.02	82 00	6 29.55	7.72
48 10	1 3.56	.36	56 40	1 26.41	.54	65 10	2 2.62	0.93	73 40	3 12.55	2.06	82 10	6 37.27	8.02
48 20	1 3.92	37	56 50	1 26.95	.55	65 20	2 3.55	0.94	73 50	3 14.61	2.09	82 20	6 45.29	8.35
48 30	1 4.29	37	57 00	1 27.50	.57	65 30	2 4.49	0.96	74 00	3 16.70	2.13	82 30	6 53.64	8.69
48 40	1 4.66	.37	57 10	1 28.07	.57	65 40	2 5.45	0 97	74 10	3 18.83	2.18	82 40	7 2.33	9.06
48 50	1 5.03	.37	57 20	1 28.64	.58	65 50	2 6.42	0.98	74 20	3 21.01	2.23	82 50	7 11.39	9.45
49 00	1 5.40	.39	57 30	1 29.22	.59	66 00	2 7.40	1.00	74 30	3 23.24	2.27	83 00	7 20.84	9.74
49 10	1 5.79	40	57 40	1 29.81	.59	66 10	2 8.40	1.01	74 40	3 25.51	2.32	83 10	7 30.58	10.17
49 20	1 6.19	40	57 50	1 30.40	.60	66 20	2 9.41	1.03	74 50	3 27.83	2.37	83 20	7 40.75	10.64
49 30	1 6.59	.40	58 00	1 31.00	.59	66 30	2 10.44	1.04	75 00	3 30.20	2.41	83 30	7 51.39	11.12
49 40	1 6.99	.40	58 10	1 31.59	.59	66 40	2 11.48	1.05	75 10	3 32.61	2.47	83 40	8 2.51	11.67
49 50	1 7.39	.41	58 20	1 32.18	.60	66 50	2 12.53	1.07	75 20	3 35.08	2.52	83 50	8 14.18	12.23
50 00	1 7.80	.39	58 30	1 32.78	.60	67 00	2 13.60	1.08	75 30	3 37.60	2.58	84 00	8 26.41	12.60
50 10	1 8.19	.40	58 40	1 33.38	.61	67 10	2 14.68	1.10	75 40	3 40.18	2.63	84 10	8 39.01	13.24
50 20	1 8.59	40	58 50	1 33.99	.61	67 20	2 15.78	1.11	75 50	3 42.81	2.69	84 20	8 52.25	13 94
50 30	1 8.99	.40	59 00	1 34.60	.62	67 30	2 16.89	1.12	76 00	3 45.50	2.75	84 30	9 6.19	14.66
50 40	1 9.39	.40	59 10	1 35.22	.62	67 40	2 18.01	1.14	76 10	3 48.25	2.81	84 40	9 20.85	15.46
50 50	1 9.79	.41	59 20	1 35.84	.63	67 50	2 19.15	1.15	76 20	3 51.06	2.88	84 50	9 36.31	16.19
51 00	1 10.20	.42	59 30	1 36.47	.64	68 00	2 20.30	1.16	76 30	3 53.94	2.95	85 00	9 52.50	
51 10	1 10.62	.43	59 40	1 37.11	.64	68 10	2 21.46	1.17	76 40	3 56.89	3.02			
51 20	1 11.05	43	59 50	1 37.75	.65	68 20	2 22 63	1.19	76 50	3 59.91	3.09			
51 30	1 11.48	44	60 00	1 38.40	.67	68 30	2 23.82	1.21	77 00	4 3.00	3.15			
51 40	1 11.92	.44	60 10	1 39.07	.67	68 40	2 25.03	1.22	77 10	4 6.15	3.25			
51 50	1 12.36	.44	60 20	1 39.74	.68	68 50	2 26.25	1.25	77 20	4 9.40	3.31			
52 00	1 12.80	44	60 30	1 40.42	.69	69 00	2 27.50	1.28	77 30	4 12.71	3.42			
52 10	1 13.24	.45	60 40	1 41.11	.69	69 10	2 28.78	1.30	77 40	4 16.13	3.49			
52 20	1 13.69	45	60 50	1 41.80	.70	69 20	2 30.08	1.32	77 50	4 19.61	3.56			
52 30	1 14.14	.45	61 00	1 42.50	.70	69 30	2 31.40	1.34	78 00	4 23.18	3.69			
52 40	1 14.59	.45	61 10	1 43.20	.70	69 40	2 32.74	1.37	78 10	4 26.87	3.79			
52 50	1 15.04	.46	61 20	1 43.90	.71	69 50	2 34.11	1.39	78 20	4 30.66	3.88			
53 00	1 15.50	46	61 30	1 44.61	.72	70 00	2 35.50	1.41	78 30	4 34.54	3.99			
53 10	1 15.96	.46	61 40	1 45.33	.73	70 10	2 36.91	1.43	78 40	4 38.53	4.11			
53 20	1 16.42	.47	61 50	1 46.06	.74	70 20	2 38.34	1.46	78 50	4 42.64	4.21			

TABLE XIX.—Augmentation of the Moon's Semi-Diameter.

Appar. Alt.	Zenith Dist.	Semi-Diameter. 14°30′	15° 0′	15°30′	16° 0′	16°30′	17° 0′
0	90°	0″00	0″00	0″00	0″00	0″00	0″00
3	87	0.71	0.75	0.80	0.86	0.92	0.97
6	84	1.41	1.50	1.60	1.71	1.83	1.94
9	81	2.11	2.25	2.40	2.56	2.73	2.90
12	78	2.81	3.00	3.20	3.41	3.63	3.86
15	75	3.50	3.74	3.99	4.25	4.52	4.80
18	72	4.17	4.46	4.76	5.07	5.39	5.73
21	69	4.84	5.18	5.52	5.89	6.26	6.65
24	66	5 49	5.88	6.27	6.68	7.11	7.54
27	63	6.13	6.56	7.00	7.46	7.93	8.42
30	60	6.75	7.23	7.71	8.22	8.74	9.28
33	57	7.35	7.88	8.40	8.96	9.52	10.12
36	54	7.93	8.50	9.07	9.67	10.28	10.92
39	51	8.49	9.10	9.72	10.36	11.02	11.66
42	48	9.03	9.68	10.34	11.02	11.72	12.44
45	45	9.55	10.23	10.93	11.65	12.39	13.15
48	42	10.05	10.76	11.49	12.25	13.03	13.83
51	39	10.52	11.26	12.02	12.81	13.63	14.46
54	36	10.95	11.72	12.52	13 34	14.19	15.06
57	33	11.35	12.15	12.98	13.83	14.72	15.62
60	30	11.72	12.55	13.40	14 29	15.20	16.13
63	27	12.06	12.91	13.79	14.70	15.64	16.60
66	24	12.37	13.24	14.14	15 08	16.04	17.03
69	21	12.64	13.53	14.46	15.41	16.39	17.40
72	18	12.88	13.79	14.73	15.70	16.70	17.73
75	15	13.08	14.01	14.96	15.95	16.96	18.01
78	12	13 24	14 18	15.15	16.15	17.18	18 24
81	9	13.37	14 32	15.30	16.31	17.35	18.42
84	6	13 46	14.42	15 41	16.42	17.47	18.55
87	3	13.52	14.48	15.47	16.49	17.54	18.62
90	0	13.54	14.56	15.49	16.51	17.57	18.65

TABLE XX.—Diminution of the Horizontal Parallax, the Equatorial Parallax being ſuppoſed

Lat.	Angle of the Vertical.	52°	53°	54°	55°	56°	57°	58°	59°	60°	61°	62°
50	10′ 9″4	5″48	5″59	5″69	5″80	5″90	6″01	6″11	6″23	6″33	6″43	6″54
51	10 5.[illegible]	5.64	5.75	5.86	5.9[illegible]	6.05	6.18	6.29	6.[illegible]0	6.51	6.62	6.73
52	10 0.6	5.80	5.91	[illegible].02	6.14	6.25	6.36	6.47	6.58	6.69	6.80	6.92
53	9 55.0	5.96	6.07	6.19	6.30	6.42	6.53	6.65	6.76	6.87	6.99	7.10
54	9 48.[illegible]	6.11	6.23	6.35	6.47	6.58	6.70	6.82	6.94	7.05	7.17	7.29
55	9 4[illegible]	6.27	6.39	6.51	6.63	6.75	6.87	6.99	7.11	7.23	7.35	7.47
56	9 34.1	6.43	6.54	6.67	6.79	6.91	7.04	7.16	7.28	7.41	7.53	7.65

Ellipticity of the Earth is here ſuppoſed $\frac{1}{334}$.

TABLE XXI.—Deviation of the Horizontal Wire of an Aſtronomical Quadrant or Circle.

Altitude.	Diſtance of Star from the Vertical Wire. 10′	20′	30′	40′	50′	60′
5°	0″1	0″3	0″7	1″2	1″9	2″7
10	0.1	0 6	1.4	2.5	3.9	5.5
15	0.2	0.9	2 1	3 7	5.8	8.4
20	0.3	1.3	2.9	5.1	7.9	11.4
25	0.4	1.6	3.6	6 5	10.1	14.6
30	0.5	2.0	4.5	8.1	12.6	18.1
35	0.6	2.4	5.5	9.8	15.3	22 0
40	0.7	2 9	6.6	11.7	18.3	26.4
45	0 9	3.5	7.9	14.0	21.8	31.4
50	1.0	4.2	9.4	16.6	26.0	37.4
55	1 2	5.0	11.2	19.9	31.2	44.9
60	1.5	6.0	13.6	24.2	37.8	54.4
65	1.9	7.5	16.8	29.9	46.8	67.4

Tables to facilitate the Uſe of the Repeating Circle.

TABLE I.

Of the change in Altitude of the Pole Star, for Half an Hour on each ſide the Meridian.

	0′	1′	2′	3′	4′	5′	6′
0″	0″0	0″1	0″3	0″6	1″0	1″6	2″3
1	0.0	0.1	0.3	0.6	1.0	1.6	2.3
2	0.0	0.1	0.3	0.6	1.0	1.6	2.3
3	0.0	0.1	0.3	0.6	1.1	1.6	2.3
4	0.0	0.1	0.3	0.6	1.1	1.7	2.4
5	0.0	0.1	0.3	0.6	1.1	1.7	2.4
6	0.0	0.1	0.3	0.6	1.1	1.7	2.4
7	0.0	0.1	0.3	0.6	1.1	1.7	2.4
8	0.0	0.1	0.3	0.6	1.1	1.7	2.4
9	0.0	0.1	0.3	0.6	1.1	1.7	2.4
10	0.0	0.1	0.3	0.6	1.1	1.7	2.4
11	0.0	0.1	0.3	0.6	1.1	1.7	2.5
12	0.0	0.1	0.3	0.7	1.1	1.7	2.5
13	0.0	0.1	0.3	0.7	1.1	1.8	2.5
14	0.0	0.1	0.3	0.7	1.2	1.8	2.5
15	0.0	0.1	0.3	0.7	1.2	1.8	2.5
16	0.0	0.1	0.3	0.7	1.2	1.8	2.5
17	0.0	0.1	0.3	0.7	1.2	1.8	2.5
18	0.0	0.1	0.3	0.7	1.2	1.8	2.6
19	0.0	0.1	0.3	0.7	1.2	1.8	2.6
20	0.0	0.1	0.4	0.7	1.2	1.8	2.6
21	0.0	0.1	0.4	0.7	1.2	1.9	2.6
22	0.0	0.1	0.4	0.7	1.2	1.9	2.6
23	0.0	0.1	0.4	0.7	1.2	1.9	2.6
24	0.0	0.1	0.4	0.7	1.2	1.9	2.6
25	0.0	0.1	0.4	0.8	1.2	1.9	2.7
26	0.0	0 1	0.4	0.8	1.2	1.9	2.7
27	0.0	0.1	0.4	0.8	1.3	1.9	2.7
28	0.0	0.1	0.4	0.8	1.3	1.9	2.7
29	0.0	0.2	0.4	0.8	1.3	1.9	2.7
30	0.0	0.2	0.4	0.8	1.3	1.9	2.7
31	0.0	0.2	0.4	0.8	1.3	2.0	2.7
32	0.0	0.2	0.4	0.8	1.3	2.0	2.7
33	0.0	0.2	0.4	0.8	1.3	2.0	2.8
34	0.0	0.2	0.4	0.8	1.4	2.0	2.8
35	0.0	0.2	0.4	0.8	1.4	2.0	2.8
36	0.0	0.2	0.4	0.8	1.4	2.0	2.8
37	0.0	0.2	0.4	0.8	1.4	2.0	2.8
38	0.0	0.2	0.4	0.9	1.4	2.0	2.8
39	0.0	0.2	0.5	0.9	1.4	2.0	2.8
40	0.0	0.2	0.5	0.9	1.4	2.1	2.9
41	0.0	0.2	0.5	0.9	1.4	2.1	2.9
42	0.0	0.2	0.5	0.9	1.4	2.1	2.9
43	0.0	0.2	0.5	0.9	1.4	2.1	2.9
44	0.0	0.2	0.5	0.9	1.4	2.1	2.9
45	0.0	0.2	0.5	0.9	1.5	2.1	2.9
46	0.0	0.2	0.5	0.9	1.5	2.2	2.9
47	0.0	0.2	0.5	0.9	1.5	2.2	3.0
48	0.0	0.2	0.5	0.9	1.5	2.2	3.0
49	0.0	0.2	0.5	0.9	1.5	2.2	3.0
50	0.0	0.2	0.5	1.0	1.5	2.2	3.0
51	0.0	0.2	0.5	1.0	1.5	2.2	3.0
52	0.1	0.2	0.5	1.0	1.5	2.2	3.0
53	0.1	0.2	0.5	1.0	1.5	2.2	3.0
54	0.1	0.2	0.5	1.0	1.5	2.2	3.1
55	0.1	0.2	0.6	1.0	1.6	2.3	3 1
56	0.1	0.2	0.6	1.0	1.6	2.3	3.1
57	0.1	0.2	0.6	1.0	1.6	2.3	3 1
58	0.1	0.3	0.6	1.0	1.6	2.3	3.1
59	0.1	0.3	0.6	1.0	1.6	2.3	3.1
60	0.1	0.3	0.6	1.0	1.6	2.3	3.2

TABLE I.—*continued.*

Of the Change of Altitude of the Pole-Star, for Half an Hour on each Side the Meridian.

	7′	8′	9′	10′	11′	12′	13′	14″	[illegible]	16′	17′	18′	19′
0″	3″2	4″1	5″2	6″4	7″8	9″3	10″9	12″6	14″5	16″5	18″6	20″8	23″2
1	3.2	4.1	5.2	6.5	7.8	9.3	10.9	12.6	14.5	16.5	18.6	20.9	23.3
2	3.2	4.1	5.3	6.5	7.8	9.3	10.9	12.7	14.5	16.5	18.7	20.9	23.3
3	3.2	4.2	5.3	6.5	7.9	9.4	11.0	12.7	14.6	16.6	18.7	21.0	23.3
4	3.2	4.2	5.3	6.5	7.9	9.4	11.0	12.7	14.6	16.6	18.7	21.0	23.4
5	3.2	4.2	5.3	6.5	7.9	9.4	11.0	12.8	14.6	16.6	18.8	21.0	23.4
6	3.2	4.2	5.3	6.6	7.9	9.5	11.0	12.8	14.7	16.7	18.8	21.1	23.5
7	3.2	4.2	5.4	6.6	8.0	9.5	11.1	12.8	14.7	16.7	18.8	21.1	23.5
8	3.3	4.3	5.4	6.6	8.0	9.5	11.1	12.9	14.7	16.7	18.9	21.1	23.5
9	3.3	4.3	5.4	6.6	8.0	9.5	11.1	12.9	14.8	16.8	18.9	21.2	23.6
10	3.3	4.3	5.4	6.6	8.0	9.6	11.2	12.9	14.8	16.8	19.0	21.2	23.6
11	3.3	4.3	5.4	6.7	8.1	9.6	11.2	13.0	14.8	16.8	19.0	21.3	23.7
12	3.3	4.3	5.4	6.7	8.1	9.6	11.2	13.0	14.9	16.9	19.0	21.3	23.7
13	3.3	4.3	5.5	6.7	8.1	9.6	11.2	13.0	14.9	16.9	19.1	21.3	23.8
14	3.3	4.4	5.5	6.7	8.1	9.7	11.3	13.1	14.9	17.0	19.1	21.4	23.8
15	3.4	4.4	5.5	6.8	8.2	9.7	11.3	13.1	15.0	17.0	19.1	21.4	23.8
16	3.4	4.4	5.5	6.8	8.2	9.7	11.3	13.1	15.0	17.0	19.2	21.5	23.9
17	3.4	4.4	5.6	6.8	8.2	9.7	11.4	13.1	15.0	17.1	19.2	21.5	23.9
18	3.4	4.4	5.6	6.8	8.2	9.8	11.4	13.2	15.1	17.1	19.2	21.5	24.0
19	3.4	4.4	5.6	6.8	8.2	9.8	11.4	13.2	15.1	17.1	19.3	21.6	24.0
20	3.4	4.4	5.6	6.9	8.3	9.8	11.4	13.2	15.1	17.2	19.3	21.6	24.0
21	3.5	4.5	5.6	6.9	8.3	9.8	11.5	13.3	15.2	17.2	19.4	21.6	24.1
22	3.5	4.5	5.7	6.9	8.3	9.9	11.5	13.3	15.2	17.2	19.4	21.7	24.1
23	3.5	4.5	5.7	6.9	8.3	9.9	11.5	13.3	15.2	17.3	19.4	21.7	24.2
24	3.5	4.5	5.7	7.0	8.4	9.9	11.6	13.4	15.3	17.3	19.5	21.8	24.2
25	3.5	4.5	5.7	7.0	8.4	9.9	11.6	13.4	15.3	17.3	19.5	21.8	24.2
26	3.5	4.6	5.7	7.0	8.4	10.0	11.6	13.4	15.3	17.4	19.5	21.8	24.3
27	3.6	4.6	5.7	7.0	8.4	10.0	11.6	13.5	15.4	17.4	19.6	21.9	24.3
28	3.6	4.6	5.8	7.0	8.5	10.0	11.7	13.5	15.4	17.4	19.6	21.9	24.4
29	3.6	4.6	5.8	7.1	8.5	10.1	11.7	13.5	15.4	17.5	19.7	22.0	24.4
30	3.6	4.6	5.8	7.1	8.5	10.1	11.7	13.5	15.5	17.5	19.7	22.0	24.5
31	3.6	4.7	5.8	7.1	8.6	10.1	11.8	13.6	15.5	17.5	19.7	22.0	24.5
32	3.6	4.7	5.8	7.1	8.6	10.1	11.8	13.6	15.5	17.6	19.8	22.1	24.5
33	3.7	4.7	5.9	7.2	8.6	10.2	11.8	13.6	15.6	17.6	19.8	22.1	24.6
34	3.7	4.7	5.9	7.2	8.6	10.2	11.9	13.7	15.6	17.7	19.8	22.2	24.6
35	3.7	4.7	5.9	7.2	8.7	10.2	11.9	13.7	15.6	17.7	19.9	22.2	24.7
36	3.7	4.8	5.9	7.2	8.7	10.2	11.9	13.7	15.7	17.7	19.9	22.2	24.7
37	3.7	4.8	5.9	7.3	8.7	10.3	11.9	13.8	15.7	17.8	20.0	22.3	24.7
38	3.7	4.8	6.0	7.3	8.7	10.3	12.0	13.8	15.7	17.8	20.0	22.3	24.8
39	3.7	4.8	6.0	7.3	8.8	10.3	12.0	13.8	15.8	17.8	20.0	22.4	24.8
40	3.8	4.8	6.0	7.3	8.8	10.3	12.0	13.9	15.8	17.9	20.1	22.4	24.9
41	3.8	4.8	6.0	7.3	8.8	10.4	12.1	13.9	15.8	17.9	20.1	22.4	24.9
42	3.8	4.9	6.1	7.4	8.8	10.4	12.1	13.9	15.9	17.9	20.1	22.5	24.9
43	3.8	4.9	6.1	7.4	8.9	10.4	12.1	13.9	15.9	18.0	20.2	22.5	25.0
44	3.8	4.9	6.1	7.4	8.9	10.5	12.2	14.0	15.9	18.0	20.2	22.6	25.0
45	3.8	4.9	6.1	7.4	8.9	10.5	12.2	14.0	16.0	18.1	20.3	22.6	25.1
46	3.9	4.9	6.1	7.5	8.9	10.5	12.2	14.0	16.0	18.1	20.3	22.6	25.1
47	3.9	5.0	6.2	7.5	9.0	10.5	12.2	14.1	16.0	18.1	20.3	22.7	25.2
48	3.9	5.0	6.2	7.5	9.0	10.6	12.3	14.1	16.1	18.2	20.4	22.7	25.2
49	3.9	5.0	6.2	7.5	9.0	10.6	12.3	14.1	16.1	18.2	20.4	22.8	25.
50	3.9	5.0	6.2	7.6	9.0	10.6	12.3	14.2	16.1	18.2	20.5	22.8	25.
51	3.9	5.0	6.2	7.6	9.1	10.7	12.4	14.2	16.2	18.3	20.5	22.9	25.3
52	4.0	5.1	6.3	7.6	9.1	10.7	12.4	14.2	16.2	18.3	20.5	22.9	25.4
53	4.0	5.1	6.3	7.6	9.1	10.7	12.4	14.3	16.2	18.3	20.6	22.9	25.4
54	4.0	5.1	6.3	7.7	9.1	10.7	12.5	14.3	16.3	18.4	20.6	23.0	25.5
55	4.0	5.1	6.3	7.7	9.2	10.8	12.5	14.3	16.3	18.4	20.6	23.0	25.5
56	4.0	5.1	6.3	7.7	9.2	10.8	12.5	14.4	16.3	18.4	20.7	23.1	25.5
57	4.0	5.2	6.4	7.7	9.2	10.8	12.5	14.4	16.4	18.5	20.7	23.1	25.6
58	4.0	5.2	6.4	7.7	9.2	10.9	12.6	14.4	16.4	18.5	20.8	23.1	25.6
59	4.1	5.2	6.4	7.8	9.3	10.9	12.6	14.4	16.4	18.6	20.8	23.2	25.7
60	4.1	5.2	6.4	7.8	9.3	10.9	12.6	14.5	16.5	18.6	20.8	23.2	25.7

For the Obſervations above the Pole, multiply the Correction found by this Table by 0.95 ; for thoſe below the Pole by 0.88.

TABLE I.—*continued.*

Of the Change in Altitude of the Pole-Star, for Half an Hour on each Side the Meridian.

	20′	21′	22′	23′	24′	25′	26′	27′	28′	29′
0″	25″7	28″3	31″1	34″0	37″0	40″2	43″4	46″8	50″4	54″0
1	25.8	28.4	31.1	34.0	37.1	40.2	43.5	46.9	50.4	54.1
2	25.8	28.4	31.2	34.1	37.1	40.3	43.5	46.9	50.5	54.1
3	25.8	28.5	31.2	34.1	37.2	40.3	43.6	47.0	50.5	54.2
4	25.9	28.5	31.3	34.2	37.2	40.4	43.7	47.1	50.6	54.2
5	25.9	28.6	31.3	34.2	37.3	40.4	43.7	47.1	50.7	54.3
6	26.0	28.6	31.4	34.3	37.3	40.5	43.8	47.1	50.7	54.4
7	26.0	28.7	31.4	34.3	37.4	40.5	43.8	47.2	50.8	54.5
8	26.1	28.7	31.5	34.4	37.4	40.6	43.9	47.3	50.8	54.5
9	26.1	28.7	31.5	34.4	37.5	40.6	43.9	47.4	50.9	54.6
10	26.1	28.8	31.6	34.5	37.5	40.7	44.0	47.4	51.0	54.6
11	26.2	28.8	31.6	34.5	37.6	40.7	44.0	47.5	51.0	54.7
12	26.2	28.9	31.7	34.6	37.6	40.8	44.1	47.5	51.1	54.8
13	26.3	28.9	31.7	34.6	37.7	40.9	44.2	47.6	51.1	54.8
14	26.3	29.0	31.8	34.7	37.7	40.9	44.2	47.6	51.2	54.9
15	26.4	29.0	31.8	34.7	37.8	41.0	44.3	47.7	51.3	55.0
16	26.4	29.1	31.9	34.8	37.8	41.0	44.3	47.8	51.3	55.0
17	26.4	29.1	31.9	34.8	37.9	41.1	44.4	47.8	51.4	55.1
18	26.5	29.2	32.0	34.9	37.9	41.1	44.4	47.8	51.4	55.1
19	26.5	29.2	32.0	34.9	38.0	41.2	44.5	47.9	51.5	55.2
20	26.6	29.3	32.1	35.0	38.0	41.2	44.6	48.0	51.6	55.3
21	26.6	29.3	32.1	35.0	38.1	41.3	44.6	48.0	51.6	55.3
22	26.7	29.3	32.1	35.1	38.1	41.3	44.7	48.1	51.7	55.4
23	26.7	29.4	32.2	35.1	38.2	41.4	44.7	48.2	51.7	55.4
24	26.7	29.4	32.2	35.2	38.2	41.4	44.8	48.2	51.8	55.5
25	26.8	29.5	32.3	35.2	38.3	41.5	44.8	48.3	51.9	55.6
26	26.8	29.5	32.3	35.3	38.4	41.6	44.9	48.3	51.9	55.6
27	26.9	29.5	32.4	35.3	38.4	41.6	44.9	48.4	51.0	55.7
28	26.9	29.6	32.4	35.4	38.5	41.7	45.0	48.5	51.0	55.8
29	27.0	29.7	32.5	35.4	38.5	41.7	45.0	48.5	52.1	55.8
30	27.0	29.7	32.5	35.5	38.6	41.8	45.1	48.6	52.2	55.9
31	27.1	29.8	32.6	35.5	38.6	41.8	45.2	48.6	53.2	56.0
32	27.1	29.8	32.6	35.6	38.7	41.9	45.2	48.7	52.3	56.0
33	27.1	29.8	32.7	35.6	38.7	41.9	45.3	48.7	52.4	56.1
34	27.2	29.9	32.7	35.7	38.8	42.0	45.3	48.8	52.4	56.1
35	27.2	29.9	32.8	35.7	38.8	42.0	45.4	48.9	52.5	56.2
36	27.3	30.0	32.8	35.8	38.9	42.1	45.5	48.9	52.5	56.3
37	27.3	30.0	32.9	35.8	38.9	42.2	45.5	49.0	52.6	56.3
38	27.4	30.1	32.9	35.9	39.0	42.2	45.6	49.0	52.7	56.4
39	27.4	30.1	33.0	35.9	39.0	42.3	45.6	49.1	52.7	56.5
40	27.5	30.2	33.0	36.0	39.1	42.3	45.7	49.2	52.8	56.5
41	27.5	30.2	33.1	36.0	39.1	42.4	45.7	49.2	52.8	56.6
42	27.5	30.3	33.1	36.1	39.2	42.4	45.8	49.3	52.9	56.6
43	27.6	30.3	33.2	36.1	39.2	42.5	45.9	49.3	53.0	56.7
44	27.6	30.4	33.3	36.2	39.3	42.5	45.9	49.4	53.0	56.8
45	27.7	30.4	33.3	36.2	39.4	42.6	46.0	49.5	53.1	56.8
46	27.7	30.4	33.3	36.3	39.4	42.6	46.0	49.5	53.2	56.9
47	27.8	30.5	33.3	36.3	39.5	42.7	46.1	49.6	53.2	57.0
48	27.8	30.5	33.4	36.4	39.5	42.7	46.1	49.6	53.3	57.0
49	27.8	30.6	33.4	36.4	39.6	42.8	46.2	49.7	53.3	57.1
50	27.9	30.6	33.5	36.5	39.6	42.9	46.3	49.8	53.4	57.1
51	27.9	30.7	33.5	36.6	39.7	42.9	46.3	49.8	53.5	57.2
52	28.0	30.7	33.6	36.6	39.8	43.0	46.4	49.9	53.5	57.2
53	28.0	30.8	33.6	36.7	39.8	43.0	46.4	49.9	53.6	57.3
54	28.1	30.8	33.7	36.7	39.8	43.1	46.5	50.0	53.6	57.4
55	28.1	30.9	33.7	36.8	39.9	43.2	46.5	50.1	53.7	57.5
56	28.2	30.9	33.8	36.8	40.0	43.2	46.6	50.1	53.8	57.5
57	28.2	31.0	33.8	36.9	40.1	43.3	46.7	50.2	53.8	57.6
58	28.3	31.0	33.9	36.9	40.1	43.3	46.7	50.2	53.9	57.6
59	28.3	31.1	33.9	37.0	40.2	43.4	46.8	50.3	54.0	57.7
60	28.3	31.1	34.0	37.0	40.2	43.4	46.8	50.4	54.0	57.8

TABLE II.

General Table of the Reduction to the Meridian. Part I. Argument. Hour Angle in Time.

Sec.	0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′
0	0″0	2″0	7″8	17″7	31″4	49″1	70″7	96″2	125″7	159″0	196″3	237″5	280″7	331″8	384″7	441″6
1	0.0	2.0	8.0	17.9	31.7	49.4	71.1	96.9	126.2	159.6	197.0	238.3	283.5	332.6	385.6	442.6
2	0.0	2.1	8.1	18.1	31.9	49.7	71.5	97.1	126.7	160.2	197.6	239.0	284.2	333.4	386.5	443.6
3	0.0	2.2	8.2	18.3	32.2	50.1	71.9	97.6	127.2	160.8	198.3	239.7	285.0	334.3	387.5	444.6
4	0.0	2.2	8.4	18.5	32.5	50.4	72.3	98.1	127.8	161.4	198.9	240.4	285.8	335.3	388.4	445.6
5	0.0	2.3	8.5	18.7	32.7	50.7	72.7	98.5	128.3	162.0	199.6	241.2	286.6	336.0	389.3	446.5
6	0.0	2.4	8.7	18.9	33.0	51.1	73.1	99.0	128.8	162.6	200.3	241.9	287.4	336.9	390.2	447.5
7	0.0	2.4	8.8	19.1	33.3	51.4	73.5	99.4	129.4	163.2	200.9	242.6	288.2	337.7	391.1	448.5
8	0.0	2.5	8.9	19.3	33.5	51.7	73.9	99.9	129.9	163.8	201.6	243.3	289.0	338.6	392.1	449.5
9	0.0	2.6	9.1	19.5	33.8	52.1	74.3	100.4	130.4	164.4	202.2	244.1	289.8	339.4	393.0	450.5
10	0.1	2.7	9.2	19.7	34.1	52.4	74.7	100.8	131.0	165.0	202.9	244.8	290.6	340.3	393.9	451.5
11	0.1	2.7	9.4	19.9	34.4	52.7	75.1	101.3	131.5	165.6	203.6	245.5	291.4	341.2	394.8	452.5
12	0.1	2.8	9.5	20.1	34.6	53.1	75.5	101.8	132.0	166.2	204.2	246.2	292.2	342.0	395.8	453.5
13	0.1	2.9	9.6	20.3	34.9	53.4	75.9	102.3	132.6	166.8	204.9	247.0	293.0	342.9	396.7	454.5
14	0.1	3.0	9.8	20.5	35.2	53.8	76.3	102.7	133.1	167.4	205.6	247.7	293.8	343.7	397.6	455.5
15	0.1	3.1	9.9	20.7	35.5	54.1	76.7	103.2	133.6	168.0	206.3	248.5	294.6	344.6	398.6	456.5
16	0.1	3.1	10.1	20.9	35.7	54.5	77.1	103.7	134.2	168.6	206.9	249.2	295.4	345.5	399.5	457.5
17	0.2	3.2	10.2	21.2	36.0	54.8	77.5	104.2	134.7	169.2	207.6	249.9	296.2	346.3	400.5	458.5
18	0.2	3.3	10.4	21.4	36.3	55.1	77.9	104.6	135.3	169.8	208.3	250.7	297.0	347.2	401.4	459.5
19	0.2	3.4	10.5	21.6	36.6	55.5	78.3	105.1	135.8	170.4	208.9	251.4	297.8	348.1	402.3	460.5
20	0.2	3.5	10.7	21.8	36.9	55.8	78.8	105.6	136.4	171.0	209.6	252.2	298.6	349.0	403.3	461.5
21	0.3	3.6	10.8	22.0	37.2	56.2	79.2	106.1	136.9	171.6	210.3	252.9	299.4	349.8	404.2	462.5
22	0.3	3.7	11.0	22.3	37.4	56.5	79.6	106.6	137.4	172.2	211.0	253.6	300.2	350.7	405.1	463.5
23	0.3	3.8	11.1	22.5	37.7	56.9	80.0	107.0	138.0	172.9	211.6	254.4	301.0	351.6	406.1	464.5
24	0.3	3.8	11.3	22.7	38.0	57.3	80.4	107.5	138.5	173.5	212.3	255.1	301.8	352.5	407.0	465.5
25	0.3	3.9	11.5	22.9	38.3	57.6	80.8	108.0	139.1	174.1	213.0	255.9	302.6	353.3	408.0	466.5
26	0.4	4.0	11.6	23.1	38.6	58.0	81.3	108.5	139.6	174.7	213.7	256.6	303.5	354.2	408.9	467.5
27	0.4	4.1	11.8	23.4	38.9	58.3	81.7	109.0	140.2	175.3	214.4	257.4	304.3	355.1	409.9	468.5
28	0.4	4.2	11.9	23.6	39.2	58.7	82.1	109.5	140.7	175.9	215.1	258.1	305.1	356.0	410.8	469.5
29	0.5	4.3	12.1	23.8	39.5	59.0	82.5	110.0	141.3	176.6	215.8	258.9	305.9	356.9	411.7	470.5
30	0.5	4.4	12.3	24.0	39.8	59.4	83.0	110.4	141.8	177.2	216.4	259.6	306.7	357.7	412.7	471.5
31	0.5	4.5	12.4	24.3	40.1	59.8	83.4	110.9	142.4	177.8	217.1	260.4	307.5	358.6	413.6	472.6
32	0.6	4.6	12.6	24.5	40.3	60.1	83.8	111.4	143.0	178.4	217.8	261.1	308.4	359.5	414.6	473.6
33	0.6	4.7	12.8	24.7	40.6	60.5	84.2	111.9	143.5	179.0	218.5	261.9	309.2	360.5	415.6	474.6
34	0.6	4.8	12.9	25.0	40.9	60.8	84.7	112.4	144.1	179.7	219.2	262.6	310.0	361.1	416.6	475.6
35	0.7	4.9	13.1	25.2	41.2	61.2	85.1	112.9	144.6	180.3	219.9	263.4	310.8	362.2	417.5	476.6
36	0.7	5.0	13.3	25.4	41.5	61.6	85.5	113.4	145.2	180.9	220.6	264.1	311.6	363.1	418.4	477.6
37	0.7	5.1	13.4	25.7	41.8	61.9	86.0	113.9	145.8	181.6	221.3	264.9	312.5	363.9	419.4	478.7
38	0.8	5.2	13.6	25.9	42.1	62.3	86.4	114.4	146.3	182.2	222.0	265.7	313.3	364.6	420.3	479.7
39	0.8	5.3	13.8	26.2	42.5	62.7	86.8	114.9	146.9	182.8	222.7	266.4	314.2	365.7	421.3	480.7
40	0.9	5.4	14.0	26.4	42.8	63.0	87.3	115.4	147.5	183.4	223.4	267.2	315.0	366.6	422.2	481.7
41	0.9	5.6	14.1	26.6	43.1	63.4	87.7	115.9	148.0	184.1	224.1	267.9	315.8	367.5	423.2	482.8
42	1.0	5.7	14.3	26.9	43.4	63.8	88.1	116.4	148.6	184.7	224.8	268.7	316.6	368.4	424.2	483.8
43	1.0	5.8	14.5	27.1	43.7	64.2	88.6	116.9	149.2	185.4	225.5	269.5	317.4	369.3	425.1	484.8
44	1.1	5.9	14.7	27.4	44.0	64.5	89.0	117.4	149.7	186.0	226.2	270.2	318.3	370.2	426.1	485.8
45	1.1	6.0	14.8	27.6	44.3	64.9	89.5	117.9	150.3	186.6	226.9	271.0	319.1	371.1	427.0	486.9
46	1.2	6.1	15.0	27.9	44.6	65.3	89.9	118.4	150.9	187.3	227.6	271.8	319.9	372.0	428.0	487.9
47	1.2	6.2	15.2	28.1	44.9	65.7	90.3	118.9	151.5	187.9	228.3	272.6	320.8	372.9	429.0	488.9
48	1.3	6.4	15.4	28.3	45.2	66.0	90.8	119.5	152.0	188.5	229.0	273.3	321.6	373.8	430.0	490.0
49	1.3	6.5	15.6	28.6	45.5	66.4	91.2	120.0	152.6	189.2	229.7	274.1	322.4	374.7	430.9	491.0
50	1.4	6.6	15.8	28.8	45.9	66.8	91.7	120.5	153.2	189.8	230.4	274.9	323.3	375.6	431.9	492.0
51	1.4	6.7	15.9	29.1	46.2	67.2	92.1	121.0	153.8	190.5	231.1	275.6	324.1	376.5	432.8	493.1
52	1.5	6.8	16.1	29.4	46.5	67.6	92.6	121.5	154.4	191.1	231.8	276.4	325.0	377.4	433.8	494.1
53	1.5	7.0	16.3	29.6	46.8	68.0	93.0	122.0	154.9	191.8	232.5	277.2	325.8	378.3	434.8	495.2
54	1.6	7.1	16.5	29.9	47.1	68.3	93.5	122.5	155.5	192.4	233.3	278.0	326.7	379.2	435.7	496.2
55	1.6	7.2	16.7	30.1	47.5	68.7	93.9	123.1	156.1	193.1	234.0	278.9	327.5	380.2	436.7	497.2
56	1.7	7.3	16.9	30.4	47.8	69.1	94.4	123.6	156.7	193.7	234.7	279.5	328.4	381.1	437.7	498.2
57	1.8	7.5	17.1	30.6	48.1	69.5	94.8	124.1	157.3	194.4	235.4	280.3	329.2	382.0	438.7	499.2
58	1.8	7.6	17.3	30.9	48.4	69.9	95.3	124.6	157.8	195.0	236.1	281.1	330.0	382.9	439.6	500.3
59	1.9	7.7	17.5	31.1	48.8	70.3	95.7	125.1	158.4	195.7	236.8	281.9	330.9	383.8	440.6	501.4

The Numbers in this Table are additive for the inferior Obſervations of Circumpolar Stars.

TABLE III.

The Numbers in this Table are always additive.

General Table. Part II. Argument. Hour Angle.

M. S.	S.	Diff.	M. S.	S.	Diff.	M. S.	S.	Diff.
0 0	0.000		8 10	0.041		12 10	0 205	
1 0	0.000		20	0.045	4	20	0.217	12
2 0	0.000		30	0.049	4	30	0.229	12
3 0	0.001		40	0.053	4	40	0.241	12
4 0	0.002		50	0.057	4	50	0.254	13
5 0	0 006		9 0	0.061	4	13 0	0.267	13
10	0.007		10	0.066	5	10	0.281	14
20	0.008		20	0.071	5	20	0.295	14
30	0.009		30	0.076	5	30	0.310	15
40	0.010		40	0.081	5	40	0.326	16
50	0.011		50	0.087	6	50	0.342	16
6 0	0.012		10 0	0.093	6	14 0	0.359	17
10	0.013		10	0.100	7	10	0.376	17
20	0.014		20	0.107	7	20	0.394	18
30	0.016		30	0.114	7	30	0.413	19
40	0.018		40	0.121	7	40	0.432	19
50	0.020		50	0.129	8	50	0.452	20
7 0	0.022		11 0	0.137	8	15 0	0.473	21
10	0.024		10	0.145	8	10	0.494	21
20	0.026		20	0.154	9	20	0.516	22
30	0.029		30	0.163	9	30	0.539	23
40	0.032		40	0.173	10	40	0.563	24
50	0.035		50	0.183	10	50	0.587	24
8 0	0.038		12 0	0.194	11	16 0	0.612	25

Explanation of the Tables.

I. That which claims a decided preference before all others, is a catalogue of 36 principal ftars vifible in the northern hemifphere, deduced from the obfervations of Dr. Mafkelyne.

II. A table of the corrections of RA in time for the ftars in the preceding catalogue, to every tenth day of the year; copied exactly from Dr. Mafkelyne's, and printed by his permiffion. This table contains the fum of the preceffion from the beginning of the year, aberration, and folar inequality of preceffion; together with an allowance for the motions of fome of the ftars, the quantity of which allowance to each ftar will be found in this copy at the bottom of its refpective column. To this table, a column for α Herculis has been added in its place by the author.

III. A table of the corrections of RA in time for the fame ftars, to every 10th degree of longitude of the moon's node; comprifing the effect of nutation and the equation of the equinoxes.

IV. and V. are two fimilar tables of the corrections of NPD for the fame ftars. The firft comprifing the effects of preceffion, aberration, and folar inequality, for every 10th day in the year. The fecond, the effect of nutation for every 10th degree of longitude of the moon's node.

Thefe two, neither of them, contain any allowance for the motions in the ftars themfelves; which feemed not to be fufficiently afcertained at the time thefe tables were conftructed.

VI. A table of the mean RA and NPD of polaris for Jan. 0. 1800, and 10 years following; together with the corrections both in RA and NPD for every 10th day of the year, and every 10th degree of longitude of the moon's node.

Thefe new tables were calculated for the year 1800. Numbers IV. and V. will ferve for many years before and after that epoch. Number VI. cannot long continue fo correct; becaufe of the rapid annual increafe of preceffion in RA and decreafe in NPD in that ftar. But if its mean RA be brought up carefully to the beginning of a year, the numbers in the firft part will fcarcely err 1″ at the utmoft in RA; nor thofe in the column for NPD 0″.01; from the truth, if the table be rightly conftructed.

Numbers VII. VIII. IX. and X. are copied from Dr. Mafkelyne; for finding the annual preceffion of a ftar in RA and NPD, with their refpective multipliers. The only alteration that has been made in thefe is in Number VII. and IX. where the argument, the RA of the ftar, is altered from the RA in degrees, &c. to RA in time; and a mean interpolation has been introduced between the numbers given by the aftronomer royal.

Next follows a fet of general tables, computed by the author on the plan of the foregoing; for deducing the apparent RA and NPD of any ftar in any part of the heavens from its mean pofition; or, *vice verfâ*, by applying the numbers taken out of the tables with a contrary fign, for deducing the mean pofition of any ftar from its obferved or apparent fituation; *viz.*

Table XI. for finding the effect of aberration on a ftar's RA in time, for every 10th day of the year, and each hour of the ftar's RA.

Table XII. for finding the effect of nutation on the ftar's RA in time, for every 10th degree of longitude of the moon's node, and each hour of the ftar's RA.

Table XII. the equations of the equinoxes in RA in time, copied from Dr. Mafkelyne.

Thefe all relate to the RA of the ftar, and its neceffary corrections. The following give the corrections for NPD:

Table XIV. for finding the effect of aberration on the NPD of a ftar, for every 10th day of the year, and each hour of the ftar's RA.

Table XV. for finding the farther effect of aberration, for every 10th day, according to the declination of the ftar.

Table XVI. for finding the femi-annual folar equation in NPD, for every 10th day, and each hour of the ftar's RA.

Table XVII. for finding the effect of nutation on the NPD of the ftar, for every 10th degree of longitude of the moon's node, and each hour of the ftar's RA.

It is hoped thefe tables will be found as convenient to the practical aftronomer as they have been to the author, who compiled them merely for his own ufe. He publifhes them with diffidence; but flatters himfelf that they are not liable to many errors, at leaft he does not feel confcious of any which it was in his power to avoid.

The above tables were publifhed by the Rev. Mr. Wollafton in his fafciculus of aftronomical obfervations: he has been fo obliging as to comply with our requeft to reprint them in this work. They are admirably calculated to diminifh the labour of reducing obfervations of right afcenfion and declination, and will no doubt be confidered as a valuable acquifition by the practical aftronomer.

Table XVIII. contains the mean refractions to every 10 minutes of zenith diftance, as derived from the obfervations of Dr. Bradley: it is taken from the Greenwich obfervations of 1797, as there given by the aftronomer royal.

Table XIX. is the augmentation of the femi-diameter of the moon, requiring no explanation.

Table XX. is the diminution of the horizontal parallax of the moon, arifing from the fpheroidal figure of the earth: the ellipticity is here fuppofed $\frac{1}{334}$, according to the lateft determinations of the figure of the earth.

Table XXI. contains the correction to be applied to an obfervation with a fixed inftrument, when the ftar has paffed or not arrived at the vertical wire, to reduce it to that which would

would have been given *at the ſame moment* by the centre of the wires.

The three tables which follow are to facilitate the uſe of the repeating circle. They give the correction to be applied to an obſervation made at a given interval of time from the tranſit of a ſtar over the meridian.

The firſt table is calculated for the pole ſtar only.

This table having been calculated ſome years ſince for the latitude of Paris, theſe numbers muſt now be multiplied by 0.95 for the ſuperior tranſit, and by 0.88 for the inferior.

The uſe of the general Tables II. and III. has been explained in the text.

The above tables contain all the corrections that occur in obſervations for determining the declinations and right aſcenſions of the heavenly bodies, except ſuch as relate to the mechanical conſtruction of the tranſit inſtrument, which will be found under that article. But as ſome doubts are entertained relative to Dr. Bradley's refractions, we ſhall annex a comparative table of refractions, as derived from the obſervations of different aſtronomers, as given in the third vol. of Mr. Vince's Aſtronomy.

A Table of Refraction, according to different Authors. The Barometer $0^{m}.760$.

Zenith-diſtance.	Therm. centes.	Laplace.	Bradley.	Burg.	Mayer.	Piazzi.	Delambre.	Mayer.
10°	− 10	11″.1	10″.9	11″.3	11″.0	11″.3	11″.3	
	0	10.4	10.6	10.9	10.6	10.8	10.8	10″.6
	+ 10	10.3	10.1	10.5	10.2	10.3	10.3	
	20	9.9	9.3	10.1	9.9	9.9	9.8	
	30	9.6	9.1	9.7	9.6	9.5	9.4	
20	− 10	22.9	23.0	23.4	22.7	23.1	23.2	
	0	22.0	21.9	22.5	21.9	22.2	22.2	21.9
	+ 10	21.2	20.9	21.6	21.1	21.0	21.2	
	20	20.4	20.0	20.8	20.4	20.1	20.3	
	30	19.7	18.8	20.1	19.7	19.4	19.5	
30	− 10	36.2	36.5	37.1	36.0	36.8	36.9	
	0	34.8	34.8	35.7	34.7	35.2	35.2	34.7
	+ 10	33.4	33.2	34.3	33.5	33.6	38.5	
	20	32.2	31.7	33.0	32.3	32.1	32.2	
	30	31.0	29.8	31.2	31.2	30.8	30.9	
40	− 10	52.9	53.0	53.9	52.3	53.4	53.7	
	0	50.8	50.5	51.8	50.4	53.9	51.2	50.4
	+ 10	48.9	48.2	49.8	48.6	48.6	48.9	
	20	47.1	46.0	47.9	46.9	46.5	46.8	
	30	45.4	43.9	46.0	45.4	43.8	44.9	
50	− 10	75.0	75.2	76.5	74.2	75.7	76.2	74.3
	0	72.1	71.7	73.5	71.5	72.2	72.6	71.5
	+ 10	69.3	68.4	70.7	68.9	69.0	69.4	68.9
	20	66.8	65.4	68.0	66.6	65.9	66.4	66.6
	30	64.4	62.3	65.3	64.4	63.3	63.7	64.4
60	− 10	108.8	109.1	111.1	107.6	110.8	110.5	107.8
	0	104.6	100.4	104.4	103.7	105.7	105.4	103.8
	+ 10	100.6	99.3	102.7	100.0	100.9	100.7	100.1
	20	96.9	94.9	96.0	96.6	96.6	96.5	96.7
	30	93.5	90.4	92.8	93.4	92.6	92.5	93.5
70	− 10	171.8	172.5	175.8	170.1	175.2	174.6	170.2
	0	165.1	164.4	168.8	163.8	165.0	166.5	163.9
	+ 10	158.8	157.0	162.4	158.0	159.6	159.1	158.1
	20	153.0	149.9	156.2	152.6	152.7	152.4	152.7
	30	147.6	142.8	150.0	147.5	146.4	146.1	147.7
80	− 10	346.0	349.3	354.9	344.1	350.9	352.8	344.0
	0	332.5	332.8	340.9	331.1	334.7	336.4	331.3
	+ 10	319.8	317.8	327.9	319.0	319.5	321.4	319.6
	20	308.1	303.5	315.4	307.9	306.0	307.9	308.6
	30	297.9	289.1	302.9	296.6	287.7	295.2	298.4
85	− 10	643.9	657.6	665.9	645.3	649.8	660.1	643.5
	0	617.8	626.7	640.1	619.6	618.2	629.3	619.8
	+ 10	594.3	598.5	616.9	593.6	591.8	601.3	597.8
	20	572.5	571.4	593.4	573.3	566.7	576.0	577.1
	30	552.2	544.5	569.9	552.4	543.2	552.2	558.3
90	− 10	2192.2	2200.2	2179.3	2100.0	2134.3	2113.1	2061.0
	0	2106.3	2096.5	2090.2	1985.9	2016.5	2014.7	1985.2
	+ 10	2026.3	2002.1	2014.3	1884.8	1944.1	1925.0	1914.7
	20	1950.1	1911.7	1937.4	1784.5	1862.5	1843.8	1849.0
	30	1882.8	1821.1	1860.8	1696.3	1784.6	1767.8	1578.1

Declination, *Circle of*, is a great circle of the ſphere paſſing through the poles of the world; and on which the declination of a ſtar is meaſured. See Declination, in *Aſtronomy*.

Declination, *Parallax of*, is an arc of the circle of declination, whereby the parallax of the altitude increaſes or diminiſhes the declination of a ſtar.

Declination, *Refraction of the*, an arc of the circle of declination, whereby the declination of a ſtar is increaſed or diminiſhed by means of the refraction.

Declination, from the Latin *declinatio*, in a general ſenſe, means the variation from a fixed point. The *declination of the magnetic needle*, or of the mariner's compaſs, is its variation from the true meridian of the place; for it hardly ever happens at any time in any place, that the magnetic needle points due north and ſouth; or that the magnetic meridian coincides with the aſtronomical meridian of the place. The quantity of this declination is uſually meaſured by an arc of the horizon, or of an horizontal circle, intercepted between the true north point of the horizon, and the north extremity of the magnetic needle. Thus, when the declination is ſaid to be twenty degrees weſt, the meaning is, that if a ſtraight line be drawn through the centre, or point of ſuſpenſion, of the needle, and through the true north point of the horizon, then the north half of the needle lies on the weſt of that line, and makes an angle of 20 degrees with it. If the declination is ſaid to be 12° eaſt, the meaning is, that the north half of the magnetic needle lies on the eaſt ſide of the line which paſſes through its centre and the true north point of the horizon, making an angle of 12° with it. It is evident that when the north half of the needle lies on the eaſt of the above-mentioned line, which, in fact, is the meridian of the place; the other half of the needle muſt lie on the oppoſite, *viz.* on the weſt ſide of that meridian line, making the ſame angle with it. But in expreſſing the declination, the north end of the needle is always underſtood.

In a manuſcript Latin letter of Peter Adſiger, on the properties of the magnet, dated in the year 1269; which is preſerved amongſt the manuſcripts of the univerſity of Leyden; expreſs mention is made of the declination of the magnetic needle. This curious letter was lately publiſhed by Mr. Cavallo, in the Supplement to his Treatiſe on Magnetiſm, which ſee. The conſtruction, however, of the magnetic needle, as deſcribed in this letter, being very rude and unfit for navigation, it is moſt probable that the compaſs began to be uſed at ſea many years after the above mentioned date, and of courſe its declination remained likewiſe unknown to the generality of people, until the time of Columbus's firſt voyage to America, which took place in the year 1492; for it is expreſsly mentioned in his life, that the declination of the magnetic needle from the true meridian was firſt diſcovered in that expedition, and that this diſcovery in an unknown ocean produced a great degree of conſternation and terror in the minds of the crew; for it ſeemed as if nature herſelf had ſuſpended its uſual laws, and had forſaken them in that perilous ſituation. Some writers have attributed the original diſcovery of the declination to Sebaſtian Cabot, a Venetian, who, they ſay, diſcovered it in the year 1500; but Columbus's claim is certainly prior to that year.

The declination, when firſt diſcovered, was ſuppoſed to be permanent or unalterable; but ſome time after it was found that the quantity of it varied in the ſame place, ſo as to be different at different times. The diſcovery of this variation of the magnetical declination is generally attributed to Mr. Gellibrand, a profeſſor in Greſham college, who firſt obſerved it about the year 1625; yet Mr. Bond, in his "Longitude Found," page 5 and 6, ſays that the declination was found to vary and to decreaſe firſt by Mr. John Mair, ſecondly by Mr. Gunter, thirdly by Mr. Gellibrand, and then by himſelf in the year 1640. Since that time it has been found that the magnetic needle not only varies after a conſiderable period, but that it is continually fluctuating, ſo that the variation of it may generally be obſerved within the period of an hour or two, and often in a much ſhorter time.

The declination is not only ſubject to a continual variation in the ſame place, but it is different in different parts of the world. It alſo varies differently in each particular place; ſo much ſo, that notwithſtanding the exertions of the greateſt philoſophers and mathematicians, no theory nor rule has been diſcovered which might furniſh the means of foretelling with accuracy the declination of the magnetic needle, for any future period, at any particular place.

That the declination is not owing to any imperfection in the conſtruction of the needles or compaſſes, or to the various ſtrength of the magnets, is proved by obſerving that all the magnetic needles of compaſſes that are ſituated near the ſame ſpot, ſhew exactly the ſame declination, provided they are freely ſuſpended, and out of the influence of each other, as well as of any other ferruginous ſubſtances.

The uncertainty of the declination at different times, and in different places, being one of the greateſt impediments to the perfection of navigation; philoſophers, mathematicians, navigators, and mechanics, have endeavoured, with admirable aſſiduity, firſt, to contrive inſtruments fit to ſhew the exact quantity of it at any particular place; ſecondly, to make, and to regiſter, the obſervations in a manner that might prove uſeful to future navigators and obſervers; and thirdly, to inveſtigate the cauſe of it, principally with a view of deriving therefrom an uſeful and ſatisfactory theory. It is now incumbent upon us to treat ſucceſſively of theſe various and important particulars.

I. The inſtruments which, according to the preſent ſtate of knowledge, are beſt adapted to ſhew the declination of the magnetic needle, will be found deſcribed under the article Compass. They are of two ſorts, *viz.* one which is to be uſed at ſea, and the other which is to be uſed upon land. That which is to be uſed at ſea, on board of ſhips, is called the *azimuth compaſs*, becauſe with it the magnetic azimuth of the ſun, or other celeſtial object, is to be aſcertained at the ſame time that the true azimuth of that ſame object is obſerved by means of a ſextant; for, from the compariſon of theſe contemporary azimuths, the declination of the magnetic needle is aſcertained, according to the rules given under the above-mentioned article *Compaſs*. But it muſt not be expected that the declination, thus determined at ſea, ſhould be very accurate. With the beſt inſtruments, and the moſt expert obſervers, the declination thus found may at moſt be depended upon within eight or ten minutes; but with the common leſs perfect inſtruments, and the ordinary claſs of nautical obſervers, the reſult of the obſervations hardly ever differs from the truth leſs than half a degree; and this ariſes principally from the difficulty of obſerving the exact magnetical azimuth of the ſun, and from the difficulty of taking the true and the magnetical azimuths at the very ſame moment. Another ſource of error ariſes from the influence of iron upon the compaſs, which at ſea is almoſt impoſſible to be avoided. Captain Flinders, who made ſeveral important experiments relative to this particular, ſays (Phil. Tranſ. for 1805.) "Whilſt ſurveying along the ſouth coaſt of New Holland in 1801 and 1802, I obſerved a conſiderable difference in the direction of the magnetic needle, when there was no other apparent cauſe for it than that of the ſhip's head, being in a different direction. This occaſioned much perplexity in laying down the bearings, and in allowing

allowing a proper variation upon them, and put me under the neceffity of endeavouring to find out fome method of correcting or allowing for thefe differences." This gentleman then relates fome ineffectual attempts he made for the purpofe of removing the caufe of the above-mentioned difference, which often amounted to fome degrees, and was at laft induced to draw the following inferences.

1. "I fuppofe," he fays, "the attractive power of the different bodies in the fhip, which are capable of affecting the compafs, to be collected into fomething like a focal point or centre of gravity, and that this point is nearly in the centre of the fhip where the fhot are depofited, for here the greateft quantity of iron is collected together."

2. "I fuppofe this point to be endued with the fame kind of attraction as the pole of the hemifphere where the fhip is; confequently, in New Holland the fouth end of the needle would be attracted by it, and the north end repelled."

3. "That the attractive power of this point is fufficiently ftrong in a fhip of war to interfere with the action of the magnetic poles upon a compafs placed upon or in the binnacle."

With fixed inftruments upon land, a much greater degree of accuracy has been attained; and it is in confequence of this accuracy that the daily or hourly variation has been difcovered; for the quantity of it from hour to hour is exceedingly fmall. This accuracy, however, is to be obtained only by paying due attention to all the known particulars which have an influence on the motion and the indications of the needle. Thefe particulars principally are; 1ft. that the magnetic meridian, or the poles of the needle, be exactly in the axis of its figure. But as this is feldom the cafe, the only expedient by which the error arifing therefrom may be afcertained and allowed for, is to turn the needle with the under fide uppermoft, (for which purpofe the cap of it is generally made to fit both fides,) and to obferve its direction again with the laft-mentioned fide uppermoft; for if the two obfervations agree, it may be concluded that the magnetic poles are in the axis of the needle; otherwife a mean of the two obfervations will give the true direction, and will point out the deviation of the magnetic axis of the needle from that of its figure, which, when once afcertained, may afterwards be allowed for, without any farther inverfions of the needle. 2dly. A true meridian line muft be had, in order to compare the direction of the needle with it. See Meridian *Line*. 3dly. Care muft be taken that the needle be not within the influence of any mafs of iron or other ferruginous matter that may be contained in the building, in the ground, or about the perfon of the obferver. We have no better means of conveying to our readers a clear idea of the practical method of afcertaining the above-mentioned caufes of error, and of compenfating for their effects, than by fubjoining part of Mr. Gilpin's account of his very careful obfervations on the variation of the magnetical declination made at the apartments of the Royal Society. This account is publifhed in the Phil. Tranf. for the year 1806; and the very inftructive part of it which we allude to is as follows:

1. "The compafs in the houfe, at the time of obfervation, was placed in the middle window, on the fouth fide of the fociety's meeting-room, upon a ftrong mahogany board. Againft the oppofite building the dial-plate of a watch is fixed, making an angle with the true meridian of 31° 8'.8 to the eaftward, as a mark to which the telefcope of the compafs was adjufted. To obtain the angle that this mark made with the true meridian, I fixed a tranfit-inftrument on the mahogany board above-mentioned, precifely in the fame place where the compafs had been placed, and having adjufted its telefcope to the faid mark, the tranfits of the fun and ftars over a vertical circle paffing through the zenith and this mark, were obferved; and the angle contained between the faid mark and the true meridian, was found by computation to be 31° 8'.8 as above.

2. "For the purpofe of afcertaining what error there might be, from a want of parallelifm between the line joining the indices and the magnetifm of the needle, and thereby to determine whether, in the ufual method of obferving, the indices fhew the true angle which the direction of magnetifm makes with the firft divifion or zero, a great many obfervations were made on both ends of the needle, and with both fides of the needle uppermoft, (the cap of the needle being made to fit on readily on either face for this purpofe); *viz.* north end and fouth end in its upright pofition, and north end and fouth end with the needle inverted, and the mean of the four giving the angle greater by 2', than that fhewn by the north end in the upright pofition of the needle, (which was the end always ufed in thofe obfervations,) two minutes have been added to all the obfervations read from the inftrument, as the correction for this error to angles on the eaft fide of zero, and fubtracted from angles on the weft fide, to obtain the true angle; which error to angles on the weft fide, however, only occurred, when the inftrument was taken out of doors to determine the effect of the iron-work of the building.

3. "The variation compafs being placed in the houfe for obfervation, could not be fuppofed to be entirely out of the influence of iron; I was, therefore, defirous to afcertain how far that influence might extend; for the determination of which, the following method was adopted.

"Having caufed to be funk into the earth to fome depth a ftrong poft, in the wood-yard of Somerfet-houfe, at a confiderable diftance from the influence of any iron, on which the compafs might be placed, and from which ftation there was a convenient mark at a proper diftance to which its telefcope could be adjufted, I took the compafs there at thofe times of the day when the needle was ftationary; *viz.* morning and afternoon; before the compafs was carried out of doors, obfervations were made in the room; then it was taken out of doors to the above-mentioned ftation for obfervation there; and the obfervations were again repeated after the compafs had been reftored to its fituation in the room; fo that, had any alteration taken place in the interval, fuch alteration would have been detected; but, during the whole feries, no material difference occurred between the obfervations made in the houfe before, and after, thofe taken in the yard.

"The obfervations, therefore, made in the yard, compared with thofe taken in the houfe, both before and after thofe taken out of it, formed the comparifon for obtaining the error, or the effect of the iron-work of the room on the needle in the houfe; and there is reafon to believe that confiderable accuracy has been obtained. They are as follows:

"By a mean of 20 fets, or 200 obfervations taken with the compafs in the yard, compared with twice that number taken in the houfe, before and after thofe taken in the yard, the variation obferved in the houfe was found to be greater than that obferved in the yard by 5'.4. The mean of nine fets of obfervations taken in the morning giving for the error 5'.5. And the mean of eleven, taken in the afternoon, giving for the error 5'.3. The variation in thofe tables have therefore been leffened by the above-mentioned quantity 5'.4; as the error for the effect of the iron-work of the room on the needle in the houfe."

II. The obfervations of the quantity of magnetical declination which have been made and regiftered in journals and other

other books, may, for the fake of perfpicuity, be divided into thofe which have been made in the fame place at different times, and thofe which have been made at different places and different times. We fhall, in the firft place, ftate the obfervations made in London at different times.

Direction of the Magnetic Needle obferved in London at different Times.

Years.	Declination.	
1580	11°	15′ E.
1612	6	10
1622	6	0
1633	4	5
1634	4	6
1657	0	0
1665	1	22 W.
1666	1	35
1672	2	30
1683	4	30
1692	6	0
1700	8	0
1717	10	42
1723	14	17
1740	15	40
1745	16	53
1748	17	40
1750	17	54
1760	19	12
1765	20	0
1773	21	09
1780	22	10
1785	22	50
1787	23	19
1790	23	39
1791	23	36
1792	23	44
1793	23	50
1794	23	54
1795	23	58
1796	24	0
1797	24	0
1798	24	0
1799	24	1
1800	24	2
1801	24	3
1802	24	6
1803	24	7.9
1804	24	8.4
1805	24	7.8
1806	24	8.6

It may be obferved, with refpect to the ftatements of the preceding table, efpecially with thofe previous to the year 1800, that they are not to be depended upon within lefs than three or four minutes; not fo much on account of the imperfection of the inftruments, or of the want of accuracy in the obfervers, as for the different times of the year, or of the day in which the obfervations were taken, which, as will prefently appear, occafion a very material difference. And it is for this reafon, principally, that when the declination for the fame year is given by different obfervers about the fame place, their ftatements feldom agree.

The firft remark which obvioufly occurs in examining the preceding table, is, that when the declination was firft obferved in London, the north end of the needle ftood on the eaft of the meridian. From that time the declination was obferved to decreafe, until about the year 1657, when the needle was found to point due north and fouth; and foon after it was obferved to proceed towards the weft. But for want of a continued feries of obfervations, we cannot precifely fay when the change from eaft to weft actually took place.

If we take the number of years elapfed fince the firft obfervation was made, as ftated in the table; *viz.* 226 years, and divide the whole angular motion of the magnetical needle, made during that period; *viz.* from 11° 15′ eaft, to 24° 8′ weft, we fhall find that the mean annual motion of the declination amounts to about 9′.4; but from an infpection of the table, and a feparate calculation for the number of years elapfed between each pair of contiguous obfervations, it evidently appears that the real increafe or decreafe of the declination has been fo very irregular, as to indicate no rule whatever by which the declination might be foretold for any future time. Latterly, however, the decreafe of the declination has been fo very fmall, as hardly to amount to ½ of a minute annually. And from this we are led to expect that the declination has reached its ultimate limit towards the weft, and that the north end of the needle will foon begin to move back towards the meridian; but no great ftrefs fhould be laid upon this indication; confidering that the movements of the magnetic needle follow no certain and determinate law. Having thus ftated the moft remarkable obfervations relative to the annual variation of the declination, it will now be neceffary to ftate thofe which relate to monthly and diurnal variation. The ingenious Mr. John Canton was the firft who took particular care to examine the daily variation of the magnetic needle, and an account of his obfervations is contained in the 31ft vol. of the Phil. Tranf. His ftatement is as follows:

The Declination obferved at different Hours of the fame Day. June 27th, 1759.

	Hours.	Min.	Declin.	Weft.	Fahr. therm.
Morning	0	18	19°	2′	62°
	6	4	18	58	62
	8	30	18	55	65
	9	2	18	54	67
	10	20	18	57	69
	11	40	19	4	68½
Afternoon	0	50	19	9	70
	1	38	19	8	70
	3	10	19	8	68
	7	20	18	59	61
	9	12	19	6	59
	11	40	18	51	57½

The mean Variation for each Month in the Year.

January	7′	8″
February	8	58
March	11	17
April	12	26
May	13	0
June	13	21
July	13	14
Auguft	12	19
September	11	43
October	10	36
November	8	9
December	6	58

Lately Mr. Gilpin made a great many accurate obfervations of the fame nature at the apartments of the Royal Society, and on account of the diftance of time, it will be ufeful to compare the mean refult of his obfervations with the

the preceding table of Mr. Canton. During 16 months, *viz.* from September 1786, to December 1787, Mr. Gilpin observed the direction of the magnetic needle at different stated hours of the day, and his observations are registered in 16 pages of the Philosophical Transactions for the year 1806, to which we must refer such of our readers as are desirous of examining the particulars minutely; but we shall subjoin his table of the mean monthly variation at different times of the day, which has been deduced from the above-mentioned 16 pages.

Mean Monthly Variation of the Magnetic Needle.

1786.	6 A. M.	7 A. M.	8 A. M.	10 A. M.	12 A. M.	1 P. M.	2 P. M.	4 P. M.	6 P. M.	8 P. M.	10 P. M.	12 P. M.
September	23° 0′.0	23° 7′.9	23° 10′.1	23° 14′.5	23° 22′.2	23° 23′.7	23° 23′.9	23° 19′.0	23° 15′.5	23° 13′.5	23° 12′.4	23° 0′.0
October		10.4	11.3	15.2	24.4	26.1	26.1	21.1	17.7	15.6	14.5	13.8
November		12.2	12.5	15.3	21.6	22.5	22.0	20.3	17.6	15.9	15.1	14.7
December			14.5	16.1	20.6	22.0	22.2	20.0	17.4	15.8	15.0	15.0
1787.												
January		14.0	14.2	17.1	22.3	24.1	24.5	21.8	18.4	15.6	14.5	14.8
February		14.2	15.1	17.1	23.3	24.8	25.1	23.6	18.8	15.3	15.8	12.8
March		12.8	12.8	15.3	26.5	27.7	27.8	18.4	19.0	15.9	15.5	15.7
April	9.7	9.9	9.7	13.9	23.6	27.0	27.4	22.6	17.8	15.7	15.7	15.6
May	7.6	7.5	7.4	13.5	25.2	26.6	26.2	21.0	17.7	17.1	16.8	17.0
June	8.4	8.2	8.8	16.0	26.6	28.1	28.1	22.6	18.7	17.9	17.8	17.7
July	9.5	9.6	10.3	17.8	27.6	29.3	29.4	23.2	19.4	18.9	19.3	19.1
August	11.9	12.0	12.8	19.7	30.3	31.7	31.5	25.6	19.3	18.7	18.9	18.8
September	15.0	15.1	15.3	20.2	29.8	30.7	30.5	24.7	20.1	19.1	19.2	19.2
October		17.5	17.3	21.1	30.8	31.9	31.6	27.4	21.9	20.8	20.2	19.6
November		19.4	19.7	20.6	29.7	31.1	30.2	27.7	22.7	21.4	21.3	21.4
December		20.4	21.0	21.8	28.2	29.0	29.0	26.2	22.9	21.9	21.6	

From the whole of the above stated observations it appears, that the magnetic needle generally is stationary at about seven or eight o'clock in the morning, at which time the variation is least; and at about one or two o'clock in the afternoon, when its variation is greatest. The mean monthly diurnal variation of the declination was found, in March 1787, to be 15′; in June 19′.6; in July 19′.6; in September 14′.8; and in December 7′.6. But on a mean of twelve years observations, from the year 1793 to 1805, Mr. Gilpin found that the diurnal alteration of variation in March was only 8′.5; in June 11′.2; in July 10′.6; in September 8′.7; and in December 3′.7. By a mean of the above-mentioned twelve years, the variation appears to increase or go westward, from the winter solstice to the vernal equinox, 0′.8; it decreases or goes eastward, from the vernal equinox to the summer solstice, 1′.43; increases again, from the summer solstice to the autumnal equinox, 2′.43; and continues nearly the same, only decreasing 0′.14, from the said equinox to the winter solstice.

Other observers in other parts of the world have remarked magnetic periods somewhat different from the above. Mr. Cotte's observations, on the diurnal variation, shew that the magnetic needle becomes stationary four times in the course of the year; *viz.* from January to March it retires from the meridian, then approaches it till May; is stationary in June, retires in July, approaches it till October, and retires from it in November and December. At Fort Marlborough in the island of Sumatra, during the year 1794, Mr. Macdonald made several accurate observations on the daily variation of the declination; from which it appears that the declination at that place (where it was little more than 1° E.) increased from about 7 in the morning, till 5 in the afternoon, and that it decreased till 7 in the morning. Mr. Macdonald likewise observed that this diurnal variation of the magnetical declination in time of thunder is greater than usual. Phil. Trans. for 1796.

The same gentleman made similar observations in the island of St. Helena in the course of the years 1795 and 1796. The declination, which at that place was 15° 48′ $34\frac{1}{2}''$ west, in November 1796, at a mean appeared to vary about 3′ 55″; *viz.* the magnetic needle is stationary from about six o'clock in the evening, till six in the morning, when it begins to move and the west variation increases, till it amounts to its maximum, at about 8 o'clock; diminishing afterwards, till it becomes stationary. Phil. Trans. for 1798.

In the island of Jamaica Mr. Robertson asserts, (Phil. Trans. for 1806) that the declination is constantly 6° 30′ east. But he is led to make this assertion from having observed old plans of estates, made soon after the year 1660; whereon the magnetic meridian was marked, and which appeared to coincide with the magnetic meridian which Mr. Robertson observed on purpose, about 140 years after the above-mentioned period. To this, however, it may be obviously objected, that the declination may, during the above mentioned interval, have moved backwards and forwards; and have at last returned to the same point. Besides, it must be remarked, that surveying instruments, as they were made about 140 years ago, were not capable of that degree of accuracy, which is necessary to shew the true declination of the magnetic needle.

Having thus far endeavoured to give our readers a sufficient account of the declination and its variation in the same place, we may now proceed to state the most important particulars relative to the declination at different places; which is of the utmost consequence to navigators.

On account of the uncertain movements of the magnetic needle in different places on the surface of the globe; the safest expedient which navigators can, and do, adopt, is to ascertain the actual declination at any particular place, where it may be deemed necessary, by using the azimuth compass, after the manner shewn under the article COMPASS. And thus, indeed, a great many observations are continually made at sea; which might be of use to future navigators at no great

great diftance of time; but they are feldom preferved and publifhed; and, if publifhed, they are to be found fcattered in a variety of books, fuch as tranfactions of learned focieties, accounts of voyages, &c. which would be too bulky and expenfive to the mariner.

The following table is a fpecimen of the declination of the magnetic needle in different parts of the world. It confifts of four columns, which contain the latitude and longitude of the place, the declination, and the year in which it was obferved.

Latitude, North.	Longitude. Weft.	Declination, Eaft.	Years in which the Obfervations were made.
° ′	° ′	° ′	
70 17	163 24	30 21	1779
69 38	164 11	31 0	1778
66 36	167 55	27 50	
65 43	170 34	27 58	
63 58	165 48	26 25	
59 39	149 8	22 54	
58 14	139 19	24 40	
55 12	135 0	23 29	
53 37	134 53	20 32	
		Weft.	
50 8	4 40	20 36	1776
48 44	5 0	22 38	
40 41	11 10	22 27	
33 45	14 50	18 7	
31 8	15 30	17 43	
28 30	17 0	14 0	
23 54	18 20	15 4	
20 30	20 3	14 35	
19 45	20 39	13 11	
16 37	22 50	10 33	
15 25	23 36	9 15	
13 32	23 45	9 25	
12 21	23 54	9 48	
11 51	24 5	8 19	
8 55	22 50	8 58	
6 29	20 5	9 44	
4 23	21 2	9 1	
3 45	22 34	8 27	
2 40	24 10	7 42	
1 14	26 2	5 35	
0 51	27 10	4 59	
0 7	27 0	4 27	
South.			
1 13	28 58	3 12	
2 48	29 37	2 52	
3 37	30 14	2 14	
4 22	30 29	2 54	
5 0	31 40	1 26	
6 0	32 50	0 6	
		Eaft.	
6 45	33 30	0 35	
		Weft.	
7 50	34 20	0 7	
8 43	34 20	0 15	
		Eaft.	
9 1	34 50	0 44	
		Weft.	
10 4	34 49	0 38	
		Eaft.	
12 40	34 49	1 12	

Latitude, South.	Longitude, Weft.	Declination, Eaft.	Years in which the Obfervations were made.
13 23	34 49	1 1	1776
14 11	34 49	1 9	
15 33	34 40	1 15	
16 12	35 20	2 4	
18 30	35 50	3 2	
20 8	36 1	5 26	
21 37	36 9	3 24	
24 17	36 8	3 24	
26 47	34 27	3 44	
28 19	32 20	1 58	
30 25	26 28	2 37	
		Weft.	
33 43	16 30	4 44	
35 37	9 30	5 51	
38 52	23 20	22 12	
	Eaft.	Eaft.	
40 36	173 34	13 47	
42 4	167 32	13 17	
		Weft.	
44 52	155 47	9 28	
46 15	144 50	14 48	
48 41	69 10	27 39	

The firft perfon who paid particular attention to the declination of the magnetic needle in different parts of the world, was the celebrated Dr. Halley; who, in the year 1685, undertook two voyages exprefsly for this purpofe. He collected, as far as it was in his power, all the obfervations made in different places relative to the declination of the magnetic needle, and its variation. And in order to render them ufeful to navigators in general, he marked them on a chart, which he called the *declination chart*. His method was as follows: He took a general map of the world, and he marked with dots all thofe places in which the declination of the magnetic needle had been afcertained; he then drew lines, whether crooked or ftraight, through all thofe points or places in which the declination was the fame; for inftance, he drew a line through all thofe places in which the declination was 5°; he drew another line through all thofe places in which the declination was 10°; and fo forth. But through the points in which there was no declination either eaftward or weftward, he drew a double line by way of diftinction, which of courfe is called *the line of no declination;* for in that line the magnetic needle pointed due north and fouth. All the above-mentioned lines are called *declination lines*, or (from their firft projector) the *Halleyan lines.* This chart was formed in the year 1700. About 60 years after, Meffrs. Mountaine and Dodfon publifhed a fimilar chart of declinations, which were principally derived from obfervations made in the courfe of the years 1744 and 1756. Phil. Tranf. for 1757.)

In Dr. Halley's chart, the line of no declination croffes the meridian of London at about the 55th degree of fouth latitude; it then proceeds in an arched direction towards the weft of that meridian; and increafing its curvature as it advances up into the northern hemifphere, it terminates at Charles town on the coaft of North America. In Mountaine and Dodfon's chart, the line of no declination paffes more weftward of the meridian of London, it advances with a more irregular curvature, and it terminates on the coaft of Florida, at about the 30th degree of north latitude. The lines of eaft declination are on the concave fide of

of the above-mentioned line, and the lines of weft declination are on its convex fide, advancing for a confiderable extent with nearly the fame curvature as the line of no declination: but, as you come on this fide of the tropic of Cancer, the lines of weft declination, in both charts, are almoft perpendicular to the meridians. In the Indian fea, and in the fea between the ifland of Madagafcar and the fouth pole, the declination lines are vaftly more irregular.

There is one remarkable circumftance to be obferved with refpect to the lines of declination on thefe charts, which is that they never crofs each other.

In the Berlin Memoirs for the year 1757, the celebrated Mr. Euler publifhed his refearches on the magnetic needle, together with a map containing the ftate of the declination lines at about the middle of the laft century. According to this author, the north magnetic pole of the earth feems, at that time, to have been fituated near the meridian which paffes by Cape St. Lucar, the fouth point of California; and between the latitudes of 70° and 80° north. See the article MAGNETISM *of the Earth*.

In the year 1768, Mr. Wilcke of Sweden alfo publifhed a declination map, wherein the lines of declination differ confiderably from thofe of the preceding maps.

Befides thefe, all the moft accurate charts of particular feas, ftraits, channels, &c. generally contain the declinations of the magnetic needle at the moft remarkable fpots within their limits, and according to the lateft obfervations previous to the publication of the chart. It may be obvioufly obferved, with refpect to the nature and the ufe of thefe declination charts, firft, that moft of the declination lines are drawn principally by conjecture, having not above two or three points only afcertained, and thofe probably not in a very accurate manner; fecondly, that the declinations at thofe points have been obferved at different times; and thirdly, that though made in the moft accurate manner imaginable, thefe charts cannot be ufeful for more than a very limited number of years. A compendious idea of the general movement of the declination lines is given by Dr. Lorimer in the following words:

" At London and Paris, where the moft accurate obfervations have been made, towards the latter end of the fixteenth century (and we cannot pretend to much earlier informations), there was between 11° and 12° of eaft declination, which gradually decreafed; fo that in lefs than an hundred years afterwards, there was no declination at all in thofe places. From 1657 at London, and 1666 at Paris, a weft declination began, and has ever fince increafed gradually, though not uniformly, or in the direct proportion of the times; for, fuch is the nature of the magnetic declination, that, like the apparent motion of the planets, fometimes it is fafter, fometimes flower, at other times it is ftationary; analogous alfo to the elongations of the inferior planets, at one time it is to the eaft, and at another time to the weft, alternately.

" We may farther obferve, that the declination lines of the fame name have always refpectively paffed London fome years before the fame lines arrived at Paris; and the like obfervations have been made in other parts of the northern hemifphere; that is, in this hemifphere the Halleyan lines have regularly paffed thofe places firft which lay moft wefterly, and fo in order thofe which lay more to the eaftward. For in the latter end of the fixteenth century, there was an eaftern declination over moft parts of Europe, while on the coaft of North America a weft declination prevailed; the line of no declination being then fituated about the Azores. This line of no declination has ever fince moved gradually eaftward, the lines of eaft declination receding before it, while the lines of weft declination have gradually followed it.

" In the fouthern hemifphere, however, it is quite otherwife; for, about the latter end of the fixteenth century, a line of no declination paffed near to the Cape of Good Hope, upon the eaft fide of which there was weft declination, and upon the weft fide thereof eaft declination; each of which declinations, in going eaftward or weftward, gradually increafed to a certain degree, and then in the fame manner decreafed to nothing, fomewhere to the eaftward of Java, one of the Eaft India iflands.

" The declination in the Pacific ocean has not as yet (1775) been fo fully afcertained; only in general we find, that the declination is eafterly over moft part of that extenfive ocean. The line of no declination, which was then fituated a little to the eaftward of the Cape of Good Hope, has ever fince been moving to the weftward, and the lines of eaft declination have gradually receded before it, while thofe of the weft declination have followed it with a proportional pace; fo that at the Cape of Good Hope, there is now a confiderable weft declination (about 24° according to the obfervations of colonel Gordon, then commander of the Dutch forces at the Cape), and the line of no declination has moved many degrees to the weftward thereof.

" From the preceding obfervations, then, it plainly appears, that the Halleyan lines in the fouthern hemifphere do gradually move from eaft to weft, while the motion of thofe lines in the northern hemifphere is from weft to eaft."

III. We fhall now proceed to treat of the theory of magnetic declination, and of its variation; previoufly to which it will be proper barely to enumerate the following facts, the particular nature of which may be feen at large under other articles of this Cyclopædia. 1. The earth is a vaft magnet, endowed with all the properties which have been obferved in common magnets. 2. The magnetic needle owes its directive property to the vicinity of this great magnet, in the fame manner as when a fmall magnetic needle is fimilarly fituated upon a common globular magnet (called a *Terrella*). 3. A magnet, whether natural or artificial, may, and moftly has, its poles not diametrically oppofite to each other, but in any other pofition. It may alfo have more than two poles. 4. The direction of the needle muft either coincide with, or deviate from, the meridian, according as the magnetic poles of the earth happen to be fituated. See MAGNETISM *of the Earth*. 5. The power of a magnet is diminifhed by heating, and is increafed by cooling; both effects, however, within certain limits. 6. The attraction between iron and the magnetic needle is increafed to a certain degree by the action of fulphuric acid upon the former. (See Cavallo's Treatife on Magnetifm.) 7. Laftly, the magnetic needle has been obferved to be difturbed in a remarkable manner; *viz.* fo as to vibrate and to vary irregularly, at the time of an aurora borealis, of thunder and lightning, of violent winds, of the eruptions of volcanoes, and of earthquakes.

That the earth, on account of its containing immenfe maffes of iron, and other ferruginous minerals, is a vaft and irregular magnet, has occurred to a variety of perfons almoft ever fince the difcovery of the magnetic needle; and that as fuch it muft act upon the needle. But Dr. Halley, confidering the above-mentioned influence of iron mines, &c. as a fecondary power, imagined that the principal movements of the needle were occafioned by the action of a large magnet placed in or near the centre of the earth, fo as

as to form a fort of nucleus to the earth. He alfo fuppofed that this magnetic nucleus had a peculiar flow motion, whence arofe the declination and its variation.

Æpinus entertained nearly the fame idea, but inftead of admitting the peculiar motion of the nucleus, he thought that its magnetic poles only changed place; and this occafioned the variation of the declination on the furface of the earth. Upon this fuppofition it is equally difficult to account for the change of the magnetic poles in the nucleus, as in any other part of the earth. It is mentioned by Mr. De Lalande, that Mr. Tobias Mayer fent him an extract of an unpublifhed memoir of his, which contains his hypothefis concerning the magnetical movements. Mayer fuppofes that a very fmall magnet, having two poles, exifts within the earth. The centre of this magnet is removed, he fuppofes, from the centre of the earth by one feventh of its radius, and recedes from it each year one thoufandth part of that diftance. The line drawn from the centre of the earth through that of the magnet, was, in 1750, at 201° of longitude, and 17° of north latitude: the longitude increafes 8′ every year, and the latitude 14′.

Mr. Biot has likewife endeavoured to explain, by means of an interior magnet, all the declinations of the magnetic needle, that have been obferved by Mr. Humboldt in his travels. He has attempted to determine, from the obfervations of La Peyroufe, and Von Humboldt, all the elements of the magnetic theory of the globe; and he has given the neceffary formula for calculating what the declination and dipping of the needle (fee Dipping *Needle*) fhould be in any given place. But the calculations made, according to this formula, have not been found to agree with the actual obfervations made by Meffrs. Humboldt, and Gay-Lufac, in their travels through Italy, France, and Germany.

Some perfons have attributed the movements of the needle to the action of celeftial bodies, or to fome aerial current of magnetic or electrical fluid.

Upon an attentive confideration of all the particulars that have been afcertained by means of experiments, and long continued obfervations, the idea of a moveable or immoveable internal magnet feems to be the leaft warranted either by analogy, or by any coincidence of the theory with the obfervations. That the various parts of the earth, according to their nature, act more or lefs forcibly upon the magnetic needle, admits of no doubt. It is alfo certain that the different concurrence of heat, cold, electricity, decompofition, and derangement, muft continually tend to alter the quantity of the above-mentioned actions upon the magnetic needle; hence the variations of the latter muft, according to the ftricteft philofophical reafoning, be derived from thefe adequate caufes, without recurring to fuppofitions purely chimerical.

Dr. Lorimer's theory, which endeavours to explain the movements of the magnetic needle by the action of the folar heat upon the earth, being the moft rational and moft intelligible, we fhall conclude this article with a ftatement of it. —"It muft be allowed, according to the obfervations of feveral ingenious gentlemen, that the collective magnetifm of this earth arifes from the magnetifm of all the ferruginous bodies therein contained, and that the magnetic poles fhould therefore be confidered as the centres of the powers of thofe magnetic fubftances. Thefe poles muft therefore change their places, according as the magnetifm of fuch fubftances is affected; and if, with Mr. Canton, we allow that the general caufe of the diurnal variation arifes from the fun's heat in the forenoon and afternoon of the fame day, it will naturally occur, that the fame caufe, being continued, may be fufficient to produce the general variation of the magnetic needle for any number of years. For we muft confider, that ever fince any attentive obfervations have been made on this fubject, the natural direction of the magnetic needle in Europe has been conftantly moving from weft to eaft, and that in other parts of the world it has continued its motion with equal conftancy.

"As we muft therefore admit, that the heat in the different feafons depends chiefly on the fun, and upon the whole, that the months of July and Auguft will probably be found the hotteft, while January and February are the coldeft months of the year; and that the temperature of the other months falls into the refpective intermediate degrees; though from calculation we can fcarce pretend to afcertain the abfolute heat of any particular month or day; fo we muft confider the influence of heat upon magnetifm to operate in the like manner; *viz.* that for a fhort time it fcarcely manifefts itfelf; yet in the courfe of a century, the conftancy and regularity thereof becomes fufficiently apparent. It would therefore be idle to fuppofe, that fuch an influence could be derived from an uncertain and fortuitous caufe; but if it be allowed to depend upon the conftancy of the fun's motion, and this appears to be a caufe fufficient to explain the phenomena, we fhould, agreeably to Newton's firft rule of philofophizing, look no farther.

"As we therefore confider the magnetic powers of the earth to be concentrated in the magnetic poles, and that there is a diurnal variation of the magnetic needle, thefe poles muft perform a fmall diurnal revolution proportional to fuch variation, and return again to the fame point nearly. Suppofe then that the fun in his diurnal revolution paffes along the northern tropic, or along any parallel of latitude between it and the equator, when he comes to that meridian in which the magnetic pole is fituated, he will be much nearer to it than in any other; and in the oppofite meridian he will of courfe be the fartheft from it. As the influence of the fun's heat will therefore act moft powerfully at the leaft, and lefs forcibly at the greateft diftance, the magnetic pole will confequently defcribe a figure fomething of the elliptical kind; and as it is well known that the greateft heat of the day is fome time after the fun has paffed the meridian, the longeft axis of this elliptical figure will lie north-eafterly in the northern, and fouth-eafterly in the fouthern hemifphere. Again, as the influence of the fun's heat will not from thofe quarters have fo much power, the magnetic poles cannot be moved back to the very fame point from which they fat out; but to one which will be a little more northerly and eafterly or more foutherly and eafterly, according to the hemifpheres in which they are fituated. The figures therefore which they defcribe, may more properly be termed elliptical fpirals. The north magnetic pole may by this means be carried, with a flow but conftant motion, more and more to the north-eaftward, till it arrives at the region of the greateft cold.

"In this manner the variation of the magnetic needle in the northern hemifphere may be accounted for. But, with refpect to the fouthern hemifphere, we muft recollect, that though the lines of declination in the northern hemifphere have conftantly moved from weft to eaft, yet in the fouthern hemifphere it is equally certain that they have moved from eaft to weft, ever fince any obfervations have been made on the fubject. Is it poffible, then, that the magnetic pole in the fouthern hemi-

fphere

ſphere can move from eaſt to weſt, while that in the northern hemiſphere moves from weſt to eaſt?—I think not. But we muſt conſider this matter a little more attentively. In the firſt place, it muſt be obſerved that in ſpeaking of the declination or variation of the magnetic needle, we always refer to the north end of the needle only; thus, when the north end of the needle points to the weſt of the meridian, we ſay it has ſo many degrees weſt variation, though the ſouth end thereof points as many degrees to the eaſtward. Again, when the north end of the needle points to the eaſtward of the meridian, we ſay it has eaſt variation, though the ſouth end points to the weſtward thereof. And the ſame language is uſed in the ſouthern as in the northern hemiſphere; ſo that if the ſouth magnetic pole, which governs the needle in that hemiſphere, move to the eaſtward, it occaſions, as we ſay, the needle to have weſt variation; and on the contrary, if it move to the weſtward, it makes what we term eaſt variation. This therefore is the cauſe, on account of which the lines of magnetic declination, or Halleyan curves, as they are now commonly called, appear to have a contrary motion in the ſouthern hemiſphere to what they have in the northern; though both the magnetic poles of the earth move in the ſame direction, that is, from weſt to eaſt."———"It is alſo curious to obſerve, that on account of the ſouthern hemiſphere being colder upon the whole than the northern hemiſphere, the magnetic poles would have moved with unequal pace; that is, the north magnetic pole would have moved farther in any given time to the north-eaſt, than the ſouth magnetic pole could have moved to the ſouth-eaſt. And, according to the opinions of the moſt ingenious authors on this ſubject, it is generally allowed, that at this time the north magnetic pole is conſiderably nearer to the north pole of the earth, than the ſouth magnetic pole is to the ſouth pole of the earth."

Declination *of a vertical plane*, or *wall*, in *Dialling*, is an arc of the horizon, comprehended either between the plane and the prime vertical circle, if you account it from eaſt to weſt; or between the meridian and the plane, if you account it from north to ſouth.

There are many ways given by authors for finding the declination of planes: the moſt practicable way is by a declinator.

DECLINATOR, or Declinatory, an inſtrument in dialling, whereby the declination, inclination, and reclination of planes is determined.

Its ſtructure is as follows: on a ſquare wooden board A B C D (*Plate* I. *Dialling*, *fig.* 1.) deſcribe a ſemicircle A E D, and divide the two quadrants thereof A E and E D into 90 degrees each, beginning from E, as in the figure. Then, having fixed a pin in the centre F, fit a wooden ruler H I upon the ſame, moveable thereon, with a box and needle K, as ſhewn under Compass.

Now, to apply this, in taking the declination of a plane: apply the ſide A D of the inſtrument to the plane propoſed, as M N (*fig.* 2.); and move the ruler F G, with the compaſs G, this way and that, about the centre F, till the needle reſt upon the line of the magnetical meridian of the place. Now, if the ruler in this ſituation cut the quadrant in E, the plane is either northern or ſouthern; but if it cut between D and E, the plane declines to the weſt, or if between A and E, to the eaſt by the quantity of the angle G F E.

The ſame inſtrument will alſo ſerve to take the inclinations and reclinations of planes. To this end, inſtead of the ruler and needle, a thread with a plumbet is fitted on a pin in the centre F: then the ſide B C of the declinator A B C D, being applied to the propoſed plane, as I L (*fig.* 3.), if the plumb-line F G cut the ſemicircle A E D in the point E, the plane is horizontal: or if it cut the quadrant E D in any point at G, then will E F G be the angle of inclination: laſtly, if applying the ſide A B to the plane, the plumbet cut E, the plane is vertical. Hence, if the quantity of the angle of inclination be compared with the elevation of the pole, and equator, it is eaſily known whether the plane be inclined or reclined. See Inclination and Reclination.

DECLINATORY Plea, in *Law*. See *Benefit of* Clergy.

DECLINATUS, Caulis, a declining ſtem, in *Botany*, expreſſes a ſtem bowed arch-wiſe towards the earth, as in the bramble, *Rubus fruticoſus*, and ſtill more remarkably in the *Ficus indica*, whoſe *declining* branches, taking root, make a whole grove of a ſingle tree. The term is ſynonymous with *reclinatus*, which laſt is moſt generally, though perhaps leſs properly, uſed by Linnæus.

DECLINE, in *Medicine*, a popular term applied to almoſt all chronic diſeaſes, in which the ſtrength and plumpneſs of the body gradually decline or decreaſe, until the patient dies. The term is ſynonymous with Consumption, (which ſee,) and is more particularly applied to conſumption of the lungs, and of the meſentery.

DECLINERS, or Declining *dials*, are thoſe which cut either the plane of the prime vertical circle, or the plane of the horizon, obliquely.

If we conceive the plane of the prime vertical circle to revolve a little upon a right line drawn from zenith to nadir, the plane will become declining; nor will it be any longer cut at right angles by the meridian, but by ſome vertical circle paſſing through the intermediate points. After the like manner an horizontal plane will be brought to decline, if revolving on the meridian line, one part of it be raiſed a little towards the zenith, and the other depreſſed towards the nadir.

The uſe of declining vertical dials is very frequent, becauſe the walls of houſes whereon dials are commonly drawn, do generally decline from the cardinal points. Incliners and recliners, and eſpecially deincliners, are very rare. See Dial.

DECLIVITY. See Acclivity.

DECLIVITIES of Mountains. On this ſubject a number of writers have remarked, that the weſtern ſides of mountains are leſs ſteep and abrupt than their eaſtern ſides; this will in a great number of inſtances be found to ariſe from the natural riſe of the ſtrata from the S. E. toward the N. W. and the ending of the ſtrata towards the weſt, which compoſe the hill or mountain. In very diſlocated parts of a country, ruptured or broken, and precipitous ſides of hills, or mountains, are to be ſeen on all ſides, almoſt indiſcriminately: but as ſuch eminences, eſpecially if ſmall, are generally occaſioned by tilts of the ruptured pieces of ſtrata, one ſide is generally much leſs ſteep than the oppoſite one. See Ending *of Strata*.

DECOCTION, in *Pharmacy*, is a very common and highly uſeful way of extracting the ſoluble and efficacious part of many drugs, particularly of barks, woods, and roots, and other ſubſtances which contain alſo much inert and inſoluble portion. The proportion of the ſubſtance boiled to the water ſeldom, if ever, exceeds an ounce of the former to a pint of the latter, and frequently half or a quarter of an ounce is ſufficient.

M. Boulduc aſſures us from his own experience, that the infuſions of vegetable purgatives act better, and produce better effects, than their decoctions, which he attributes to this, that the pureſt and moſt active principles of thoſe bodies are diſſipated and evaporated by a boiling heat. Me-

moires de l'Academie Royale des Sciences, an. 1710. And M. Beaumè, in his Elements of Pharmacy, obferves, that the infufion of Peruvian bark, made without heat, contains more of its principles than the decoction; becaufe heat feparates and precipitates a confiderable quantity of refinous fubftance, of which the bark confifts: and it is obferved in general, that decoction ought not to be employed but when abfolutely neceffary, or when the fame principles and the fame quantity of thefe principles cannot be obtained by an infufion without heat.

Decoction *of Bark*. See Cinchona.

Decoction *of Barley*. See Barley.

Decoction *for a Clyfter*, is prepared by boiling one ounce of the dried leaves of mallow, and half an ounce of dried chamomile, in a pint of water, and ftraining the liquor.

Decoction *of Elm*, is made by boiling four ounces of frefh elm bark, neareft the wood, bruifed, in four pints of diftilled water, to two pints, and ftraining the liquor. This decoction, given in dofes of half a pound twice or thrice a-day, is recommended in various chronical cutaneous eruptions; more efpecially when accompanied with purging medicines.

Decoction *for Fomentation*, is made by boiling for a fhort fpace of time fouthern-wood, fea-wormwood, and chamomile, of each dried, one ounce by weight, and half an ounce by weight of dried bay-leaves, in fix pints of diftilled water, and ftraining the liquor.

Decoction *of Hartfhorn*, is made by boiling, and conftantly ftirring, two ounces by weight, of hartfhorn burnt and prepared, and fix drams by weight of gum arabic, in three pints of diftilled water, to two pints, and then ftraining. This decoction, though a much weaker abforbent than the *mixtura cretacea*, is much more agreeable to moft people. It is ufed as common drink in fevers, attended with laxity of bowels.

Decoction *of white Hellebore*, is prepared by boiling one ounce by weight of white hellebore, powdered, in two pints of diftilled water to a pint, and when the liquor is cold and ftrained, adding two ounces by weight of rectified fpirit of wine. This is a very efficacious application in defædations of the fkin, as in tinea, &c. It may be diluted at difcretion.

Decoction *of Sarfaparilla*. See Sarsaparilla.

DECOLLATION, Beheading, a term frequently ufed in the phrafe, decollation of St. John Baptift, which denotes a painting, wherein is reprefented the Baptift's head, ftruck off from his trunk; or the feaft held in honour of that martyr.

DECOMPOSITA Folia. See Leaf.

DECOMPOSITION, Chemical, is the refolution of a compound fubftance into its conftituent parts, which are exhibited either feparate, or in fome new combination. For obfervations on the limits and laws of chemical decompofition, fee Affinity.

Decomposition, in *Natural Hiftory*, is that decay or change, which moft of the ftrata of the earth, however hard, are found to undergo when expofed to the viciffitudes of the atmofphere, and often in the parts where different fubftances come in contact with each other; which laft kind of decompofition has in fome inftances of late been fuppofed to arife from a galvanic influence, excited by the fuperpofition of different kinds of ftrata upon each other. By decompofition it has been, that a large portion of the mould, or vegetable earth, found fo uniformly diftributed on the furface of the globe, has been formed; gravel, or heterogeneous mixtures of different fubftances are evidently more fubject to decompofition than others which are lefs compounded; and hence probably has arifen the great depth of foil, and fertility of fome gravelly diftricts, where quartz, pebbles, and fand do not too much abound. The nature of fome rocky ftrata is fuch, that they are never found in a hard or ftony ftate upon the furface, or at their out-crop, but are always here feen decompofed, and in a foft or friable ftate, although the fame ftratum, when covered by others, prefents a hard rock. Coal, in like manner, is always imperfect at its out-crop, and often the richeft feams of this valuable fubftance prefent but a meer fmut, or blackening of the earth, at their out-burft to the day.

Decomposition is ufed by Boyle, Newton, and other Englifh authors, to fignify the compofition or junction of two or more bodies, which were previoufly compounded of other parts.

DECONUS, or Doconus, in *Ancient Geography*, a river of Afia, which had its fource in mount Caucafus, and difcharged itfelf into the Phafis.

DECORATION, in *Architecture*, any thing that adorns and enriches a building, church, triumphal arch, or the like, either without-fide, or within.

The orders of architecture contribute greatly to the decoration; but then the feveral parts of thofe orders muft have their juft proportions, characters, and ornaments; otherwife the fineft order will bring confufion rather than richnefs.

Decorations in churches are paintings, vafes, feftoons, &c. occafionally applied to the walls; but that with fo much fkill, as not to take off any thing from the form of the architecture; as is much practifed in Italy, at the folemn feafts.

Decoration is more properly applied to the fcenes of theatres, which muft be frequently changed, conformably to the fubject.

The ancients had two kinds of decorations for their theatres: the firft called verfatiles, having three fides, or faces, which were turned fucceffively to the fpectators; the other, called ductiles, fhewing a new decoration by drawing or fliding another before it.

The latter fort is ftill ufed, and apparently with much greater fuccefs than among the ancients, who were obliged to draw a curtain whenever they made a change in the decoration; whereas in our ftage the change is made in a moment, and almoft without being perceived.

DECORIANA, in *Ancient Geography*, an epifcopal town of Africa, in the Byzacene territory.

DECORTICATION, the act of peeling, or unhufking roots, feeds, fruits, branches, &c. or of freeing them from their barks, rinds, hufks, or fhells.

DECORUM, or Decor, in *Architecture*. This word is ufed by Vitruvius to exprefs the propriety or congruity of a building with refpect to its purpofe, fituation, &c. which he illuftrates by various inftances. Thus the temples erected to Jupiter the Thunderer, to the Heavens, the Sun, or the Moon, are to be built uncovered, becaufe the influences and effects of thofe deities are perceived in the open air. To Minerva, Mars, and Hercules, temples of the Doric order fhould be erected; and to Venus, Flora, Proferpine, and the Nymphs of the Fountains, Corinthian temples, the gay and graceful manner of that order correfponding with the character of the goddeffes. To Juno, Diana, and Bacchus, the Ionic order is to be appropriated, as poffeffing a middle character between the feverity of the Doric, and the tendernefs of the Corinthian. Decor, with regard to cuftom, is obferved, when the internal parts of edifices being magnificent, the acceffes are alfo made fuitable and elegant.

elegant. Again, if dentils are carved in the cornice of the Doric order, or, if triglyphs are reprefented in the frieze of Ionic columns, this confufion of the characteriftics of the orders muft be confidered as a violation of decorum. Decor, with regard to nature, confifts in all temples being placed in a falutary fituation, in the neighbourhood of fprings of water, but efpecially the temples of Efculapius and Health, by whofe healing influence numbers of fick appear to be recovered. For the difeafed perfons being removed from an unhealthy to a healthy fituation, and the falutiferous waters of the fountains being adminiftered, they are foon recovered. By this means it will happen that the natural effects of the place will increafe the received opinion of the power of the divinity. This part of decor is alfo obferved, when chambers and libraries receive their light from the eaft; baths and winter apartments from the weft; picture galleries, and fuch rooms as require a fteady light, from the north.

DECOUPLE', in *Heraldry*, the fame as uncoupled, *i. e.* parted, or fevered.

Thus a chevron decouplé is a chevron wanting fo much towards the point, that the two ends ftand at a diftance from each other.

DECOURS, or DECRESSANT, in *Heraldry*. See DECREMENT.

DECOY, a place made fit for catching of wild fowl.

Hence alfo a decoy-duck is one that flies abroad, and lights into company of wild ones, and, being become acquainted with them, by her allurement draws them into the decoy place, where they become a prey. See FOWL.

The decoy is ufually made where there is a large pond, furrounded with wood, and behind it a marfhy and uncultivated country, where the wild-fowl may fecurely fleep during the day-time. The decoy confifts of feveral pipes, as they are called, which lead up a narrow ditch, that cloſes at laft with a funnel-net. Over thefe pipes, which become narrower from the firft entrance, is fixed a continued arch of netting, fufpended on hoops. There is ufually a pipe or ditch for almoft every wind that can blow, as the wild-fowl are determined by this circumftance which pipe to choofe; and the decoy-man always keeps on the leeward fide of the ducks, to prevent his effluvia from reaching their fagacious noftrils. Skreens made of reeds are placed at certain diftances along each pipe, in fuch a manner, that it is impoffible for the wild-fowl to fee the decoy-man, before they have paffed towards the end of the pipe where the net is fixed. In the evening, when the wild-fowl begin to feed, the decoy rifes, and the noife of their wings, in their flight, may be heard at a great diftance. The rifing of the decoy is in Somerfetfhire called rodding. The decoy-ducks are fed with hemp-feed, which is thrown in fmall quantities over the fkreens, to bring them forwards into the pipes, and to allure the wild-fowl to follow. They are fo trained as to lead the way, after hearing the whiftle of the decoy-man, and enticed by the hemp-feed, and to dive under water, whilft the wild-fowl fly on, and are taken in the net. When they are in fuch a fleepy ftate as not to follow the decoy-ducks, a fmall dog is made to pafs between the fkreens, approaching gradually nearer and nearer to the purfe-net; which draws the attention of the wild-fowl, and makes them to advance forward; at length the decoy-man appears behind a fkreen, and drives them into the net.

The general feafon for catching wild-fowl in decoys is from the latter end of October till February. The act of 10 Geo. II. cap. 32. forbids taking them from June 1 to Oct. 1, under a penalty of five fhillings for every bird deftroyed within that time. The Lincolnfhire decoys, which principally fupply the London markets, are rented from 5*l.* to 20*l.* a year. Pennant's Zoology, vol. ii. p. 594. 8vo. 1776.

DECOY, in a *Military Senfe*, refers to the artifice, frequently reforted to, either of tempting an enemy to deviate from his intended route, under the expectation of cutting off a body of troops; or of prefenting to him the appearance of weaknefs, where a ftrong body is pofted. This kind of device fometimes fucceeds againft inexperienced or fanguine commanders; but may generally be diftinguifhed by the obvious pains taken to render the decoy confpicuous. The cautious commander will ever hold in mind that fuch military operations as are intended to be effectual, are conducted with fecrecy and concealment; he will therefore fufpect every ftudied difplay, and, without omitting thofe due precautions their reality might require, will confider them as lures held out for the purpofes of ambufcade, or to produce a diverfion of his ftrength towards that quarter. If he fhould refolve on afcertaining the true ftate of matters, it ought to be done in the day-time, by means of a fmall advanced party, well fupported by a fufficient body. In a clofe country too much precaution cannot be taken to prevent furprife from concealed parties: in an open country, cavalry will be the beft to employ for reconnoitring the fufpicious operations; which ordinarily feem to peep over the brow of a hill, or from the fkirts of woods, or along the banks of rivers and hollows.

DECOY, in *Sea Language*, denotes a ftratagem employed by a fmall fhip of war to betray a veffel of inferior force into a purfuit, till fhe comes within gun-fhot. The ftern and fides are painted fo as to difguife the fhip, and the emblems and ornaments of the nation to which the ftrangers belong, are affumed. When the adverfary is allured to chafe, the decoy is continued by fpreading a great fail, as if fhe endeavoured to efcape; but her courfe is retarded by an artful alteration of her trim. The decoy is alfo performed for eluding the chafe of a fhip of fuperior force in a dark night, by throwing out a lighted cafk of pitch, which will burn for a confiderable time and mifguide the enemy. When the cafk is thrown out, the courfe of the efcaping fhip is changed.

DECREE, DECRETUM, an order or refolve, made by a fuperior power for the regulation of an inferior.

The commerce between foul and body, F. Malebranche obferves, has no other vinculum, or connection, but the efficacy of the divine decrees. Second caufes only execute the decrees of Providence.

The doctrine of the Calvinifts has been charged with implying that God concurs to fin by a pofitive decree; in that, if crimes were not ordained by an antecedent decree, God could not forefee the events.

DECREES of councils are the laws made by them to regulate the doctrine and policy of the church.

DECREE was originally ufed by the lawyers for any thing ordained by the prince, upon cognizance of a caufe.

But the canonifts now reftrain the word decree to the ordinances of popes, which form the firft part of the canon-law; as the name canon is to what is ordained by councils.

DECREES in chancery are the determinations or fentences of the lord chancellor, upon full hearing, and weighing the merits of the caufe.

A decree in chancery is of the fame nature with a judgment at common law (Chanc. Rep. 234.) Where there is but one witnefs againft the defendant's anfwer, the plaintiff can have no decree. (1 Vern. 161.) See COURT *of Chancery*.

Several queftions and difputes were not many years ago very warmly agitated concerning the authority of the mafter

of the rolls to hear and determine causes, and his general power in the court of chancery; to quiet which it was declared by statute 3 Geo. II. c. 30. that all orders and decrees by him made, except such as by the course of the court were appropriated to the great seal alone, should be deemed to be valid; subject nevertheless to be discharged or altered by the lord chancellor, and so as they shall not be inrolled, till the same are signed by his lordship. In case of cross causes, when all parties are heard, the court pronounces the decree, adjusting every point in debate according to equity and good conscience; which decree being usually very long, the minutes of it are taken down, and read openly in court by the registrar. The chancellor's decree is either *interlocutory* or *final*. It very seldom happens that the first decree can be final or conclude the cause; for, if any matter of fact is strongly controverted, this court is so sensible of the deficiency of trial by written depositions, that it will not bind the parties thereby, but usually directs the matter to be tried by jury; especially such important facts as the validity of a will, or whether A is heir at law to B, or the existence of a "modus decimandi," or real and immemorial composition for tithes. But as no jury can be summoned to attend this court, the fact is usually directed to be tried at the bar of the court of king's bench, or at the assises, upon a feigned issue. Thus also, if a question of mere law arises in the course of a cause, it is the practice of this court to refer it to the opinion of the judges of the court of king's bench or common pleas, upon a case stated for that purpose, wherein all the material facts are admitted, and the point of law is submitted to their decision; who thereupon hear it solemnly argued by counsel on both sides, and certify their opinion to the chancellor. Upon such certificate the decree is usually founded. The completion of decrees is retarded by the following circumstances. Frequently long accounts are to be settled, incumbrances and debts to be inquired into, and an hundred little facts to be cleared up, before a decree can do full and sufficient justice. These matters are always by the decree on the first hearing referred to a master in chancery to examine, which examination often lasts for years; and then he is to report the fact, as it appears to him, to the court: this report may be excepted to, disapproved, and overruled; or otherwise, is confirmed, and made absolutely order of the court.

If either party to the suit should think himself aggrieved by a decree, he may petition the chancellor for a re-hearing, whether it was heard before the chancellor himself or any of the judges sitting for him, or before the master of the rolls. For in all cases it is the chancellor's decree, and must be signed by him before it is enrolled; which is done of course unless a re-hearing be desired. Every petition for a re-hearing must be signed by two counsel of character, usually such as have been concerned in the cause, certifying that they apprehend the cause is proper to be re-heard. And upon the re-hearing all the evidence taken in the cause, whether read before or not, is now admitted to be read; because it is the decree of the chancellor himself, who now only sits to hear reasons why it should not be enrolled and perfected; at which time all omissions of either evidence or argument may be supplied. (Gilb. Rep. 151, 152.) But, after the decree is once signed and enrolled, it cannot be reheard or rectified, but by bill of review, (see REVIEW) or by appeal to the house of lords. An appeal to parliament, that is, to the house of lords, is the dernier resort of the subject who thinks himself aggrieved by any interlocutory order or final determination in this court; and it is effected by petition to the house of peers, and not by writ of error, as upon judgments at common law. This jurisdiction is said to have begun in 18 Jac. I.; and it is certain, that the first petition, which appears in the records of parliament, was preferred in that year; and that the first which was heard and determined (though the name of appeal was then a novelty) was presented in a few mouths after; both levelled against the lord chancellor Bacon for corruption, and other misbehaviour. It was afterwards warmly controverted in the reign of Charles II. But the dispute is now at rest, (Brow. Parl. c. 8.) it being obvious to the reason of all mankind, that when the courts of equity became principal tribunals for deciding causes of property, a revision of their decrees (by way of appeal) became equally necessary, as a writ of error from the judgment of a court of law. But no new evidence is admitted in the house of lords on any account, this being a distinct jurisdiction. (Gilb. Rep. 155, 156.) It is a practice unknown to our law, (though constantly followed in the spiritual courts,) when a superior court is reviewing the sentence of an inferior, to examine the justice of the former decree by evidence that was never produced below. Blackst. Comm. book iii.

DECREES *of the Court of Session*, in *Scots Law*, are either *in foro contradictoris*, where both parties have litigated the cause, or in absence of the defender. Decrees of the session *in foro* cannot, in the general case, be again brought under the review of the court, either on points which the parties neglected to plead before sentence (which are called *competent* and *omitted*), or upon points pleaded and found insufficient (proponed and repelled). But decrees, though *in foro*, are reversible by the court, where either they labour under essential nullities, *e. g.* where they are *ultra petita*, or not conformable to their grounds and warrants, or founded on an error *in calcul*, &c. or where the party against whom the decree is obtained has thereafter recovered evidence sufficient to overturn it, of which he knew not before. See SENTENCE.

Decrees in absence of the defender, have not the force of *res judicatæ*, *i. e.* of sentences or decrees which exclude all review or rehearing as to him; for where the defender does not appear, he cannot be said to have subjected himself by the judicial contract which is implied in "contestatio litis;" a party therefore may be restored against these, upon paying to the other his costs in recovering them. The sentences of inferior courts may be reviewed by the court of session; before decree, by advocation; and after decree, by suspension or reduction; which two last are also the methods of calling in question such decrees of the session itself, as can again be brought under the review of the court.

Decrees are reviewed either by reduction or suspension. The former is the proper remedy, either where the decree has already received full execution by payment, or where it decrees nothing to be paid or performed, but simply declares a right in favour of the pursuer. For the remedy of suspension, see SUSPENSION. For the execution of decrees, see EXECUTION.

DECREES *arbitral*, are sentences proceeding on a submission to arbiters, which is a contract entered into by two or more parties who have disputable rights or claims, by which they refer their differences to the final determination of an arbiter or arbiters, and oblige themselves to acquiesce in what shall be decided. Where the day within which the arbiters are to decide is left blank in the submission, practice has limited the arbiters power of deciding to a year. But where a submission is indefinite, without specifying any time, like all other contracts or obligations, it subsists for 40 years. As arbiters are not vested with jurisdiction, they cannot compel witnesses to make oath before them, or the exhibition of writings; but the court of session supplies this defect, by granting warrants at the suit of the arbiters, or of

of either of the parties, for citing witneffes or for the exhibition of writings. The arbiters have merely power to decide; but the execution of the decree belongs to the judge. Decrees arbitral are not reducible upon any ground, except corruption, bribery, or falfehood.

DECREMENT, or DECRESSANT, in *Heraldry*, denotes the wane, or decreafe of the moon, when fhe is receding from the full towards the new.

In this ftate fhe is called, in blazon, a moon-decreffant, or en decours; fince to call it a crefcent, would be improper, as that term denotes an increafe. The moon looking to the left fide of the efcutcheon, is always fuppofed to be decreffant: when fhe faces the right fhe is crefcent, or in her growth.

DECREMENT, *equal, of life*. See COMPLEMENT *of life*.

DECREPITATION is the violent crackling and motion excited by fuddenly heating any falt or other hard fubftance which contains a little water or other evaporable fluid, but much lefs than is fufficient for liquefaction. Common falt affords a perfect inftance of decrepitation when thrown on a very hot fhovel, or in the fire.

DECREPITUDE, in *Medicine*, the confequences of the infirmities of old age: which by degrees leads to death. See DEATH.

DECRETAL, a refcript, or letter of a pope, whereby fome point or queftion in the ecclefiaftical law is folved, or determined: or a digeft of the canons of all the councils that pertained to one fubject under one head.

The decretals, *literæ decretales*, compofe the fecond part of the *Canon law*, which fee.

All the decretals attributed to the popes before Siricius, in 318, are evidently fuppofititious. They are fuppofed by fome the fpurious offspring of Ifidore, archbifhop of Seville, by reafon the collection thereof bears the name of Ifidore Peccator, or Mercator. They were firft publifhed by Riculph, bifhop of Mentz, in the ninth century.

Pope Gregory IX. in the thirteenth century, procured a compilation to be made of all the decretals or pontifical conftitutions of his predeceffors, in five books, by friar Raimond, a Dominican, his chaplain; which is the only collection authorifed by the holy fee to be read in fchools.

Thefe decretals, publifhed by Gregory IX., fays Mr. Hume, (Hift. Eng. vol. ii. p. 229.) are a collection of forgeries favourable to the court of Rome, and confifting of the fuppofed decrees of popes in the firft centuries. The forgeries are fo grofs, and confound fo palpably all language, hiftory, chronology, and antiquities; matters more ftubborn than any fpeculative truths whatfoever; that even that church, which is not ftartled at the moft monftrous contradictions and abfurdities, has been obliged to abandon them to the critics. But in the dark period of the 13th century, they paffed for undifputed and authentic; and even, entangled in the mazes of this falfe literature, joined to the philofophy, equally falfe, of the times, had nothing with which to defend themfelves, but fome fmall remains of common fenfe, which paffed for profanenefs and impiety, and the indelible regard to felf-intereft, which, as it was the fole motive in the priefts for framing thefe impoftures, ferved alfo, in fome degree, to protect the laity againft them.

DECRETUM GRATIANI. See CANON *Law*.

DECTUNINES, in *Ancient Geography*, a people of Italy, in Liguria.

DECTURAPOUR, in *Geography*, one of the Laccadive iflands, in the Indian fea. N. lat. 12° 8′. E. long. 72°.

DECUARIA, in *Ancient Geography*, a town of Albion, according to the anonymous writer of Ravenna; fuppofed by Camden to be Beverley.

DECUBITUS, in *Medicine*, the manner or pofture in which a fick perfon lies in bed.

This circumftance is of confiderable importance in the obfervation of the phyfician, as it indicates very accurately the degree and extent of feveral fymptoms, by which his judgment of the event of the difeafe may be directed. The moft natural and agreeable pofition of the body in bed, is when we lie on one fide, with the limbs drawn out of the right line, or half-contracted, fo that both fets of mufcles, the flexors and extenfors, fhall be in a ftate of relaxation. When we obferve a patient, therefore, lying in this pofition, efpecially if fleeping, we may infer, that he is deftitute of great pain, that the functions are going on with freedom and eafe, and that he is poffeffed of a certain degree of ftrength. For, on the contrary, when any important organ is in pain, or difturbed in its functions, this natural pofition of the limbs is generally altered. Thus, when the bowels and ftomach are affected with pain, the thighs are commonly contracted inftinctively towards the abdomen, by which the mufcles of that part are relaxed, and preffure leffened on the bowels. Thus alfo, when the lungs or liver are difeafed, the patient cannot lie on one or the other fide. In many diforders of the former, as in peripneumony, hydrothorax, &c. he fits upright; not becaufe his difeafe is diminifhed, as a fuperficial obferver might fuppofe, but becaufe he is threatened with fuffocation, if he attempt to affume the horizontal pofture, in confequence of the change of pofition of the fluids effufed within the cheft. Some degree of mufcular power is requifite to retain the body on one fide; fo that in the latter ftages of malignant fevers, and other difeafes of extreme debility, the failure of the vital powers is indicated by the pofture of the patient; he always is found on his back, with his limbs extended, in confequence of the general relaxation of all the mufcles both of the trunk and limbs.

DECUMA, in *Ancient Geography*, a borough of Spain, dependent on the community of Colonia Patricia, or Cordova, and fituated near the town of Sacilis (Alcorucen), and before the confluence of the rivers Bœtis and Singulis.

DECUMÆ. See DECIMÆ.

DECUMANI, in *Ancient Geography*, a people of Gallia Narbonnenfis; fo called, as it is fuppofed, becaufe they were a colony drafted from the 10th legion.

DECUMANNI DENTES, a term ufed by the Latin writers on heraldry to exprefs that fort of line in arms, which we call danfette or dancetté. See DANCETTE.

It is a kind of indented line, but is very large, and has very few teeth, commonly no more than three. It is fuppofed to have been in its origin no other than the letter M, with its two legs extended from one fide of the field to the other.

DECUMANUS. See DECIMÆ.

DECUMARIA, in *Botany*, (from *decuma* or *decima*, in allufion to the tenfold ftructure, not indeed very conftant, of the flower and fruit.) Linn. Gen. 238. Schreb. 310. Wild. Sp. Pl. v. 2. 850. Juff. 324. (Forfythia. Walt. Carol. 154.). Clafs and Order, *Polyandria Monogynia*. Nat. Ord. *Myrti*. Juff.

Gen. Ch. *Cal.* Perianth urceolate, with eight, nine, or ten minute, ovate, acute, coloured teeth, at length reflexed. *Cor.* Pet. eight, nine, or ten, lanceolate, obtufe, equal, inferted into the rim of the calyx in a fimple row, fpreading. *Stam.* Filaments 16 to 27, inferted into the calyx, threadfhaped, equal, as long as the petals. Anthers roundifh, of two cells, compreffed. *Pift.* Germen inferior, turbinate.

Style

Style ſhort, columnar. Stigma capitate, with about ten furrows. *Peric.* Capſule turbinate, furrowed, crowned with the calyx and ſtyle, of from eight to ten cells. *Seeds* numerous, imbricated, chaffy.

Eſſ. Ch. Calyx urceolate, with about ten teeth. Petals eight—ten. Capſule of about ten cells. Seeds numerous, imbricated, chaffy.

D. *barbara*, Linn. Sp. Pl. 1663, the only ſpecies, is a native of Carolina, not, as Schreber and Linnæus ſuppoſed, of Africa. This is a ſhrub, whoſe ſtem clinging by means of fibres to the trunks and branches of trees, climbs to a great height. The leaves are oppoſite, ſtalked, elliptical or obovate, varying in breadth, of a deep ſhining green, veiny, ſmooth except when very young, ſerrated chiefly towards the point. Stipulas none. Flowers in a terminal corymboſe panicle, cream coloured, fragrant, ſomewhat reſembling thoſe of the lime-tree, but ſmaller. Capſules of an elegant urn-like form, with longitudinal furrows.

This is the *Forſythia ſcandens* of Walter in his Flora Caroliniana; nor is the *Decumaria ſarmentoſa* of Boſc, Act. Soc. Hiſt. Nat. Paris, 76, t. 13, as far as we can diſcern, at all different from the above. S.

DECUPLE, in *Arithmetic*, a term of relation, or proportion, implying a thing to be ten times as much as another.

DECURIO, the chief, or commander of a decury, both in the Roman army, and in the college or aſſembly of the people. See Decury.

Decurio *municipalis*, was a name given to the ſenators of the Roman colonies.

They were called decuriones, becauſe their court or company always conſiſted of ten perſons, or becauſe, as ſome ſay, when the colony was firſt planted, every tenth man was made a ſenator. The fortune requiſite for being elected a decurio, under the emperors, was 100,000 ſeſtertii. Plin. Epiſt. i. 19. See Decury.

By means of this appointment, the cities of Italy, at leaſt, ſuch as had colonies, had a ſhare under Auguſtus, in the election of the Roman magiſtrates; the decurions, or ſenators of thoſe cities, having ſuffrages therein, which they ſent, ſealed up, to Rome, a little before the election.

Whilſt, under the emperors, every thing that was honourable or important in the adminiſtration of the revenue, was committed to the wiſdom of the præfects, and their provincial repreſentatives; the laborious offices, which could be productive only of envy and reproach, of expence and danger, were impoſed on the decuriones, who formed the corporations of the cities; and whom the ſeverity of the imperial laws had condemned to ſuſtain the burthens of civil ſociety. The title concerning the decurions (l. xii. tit. 1.) is the moſt ample in the whole Theodoſian code; ſince it contains not leſs than 192 diſtinct laws, to aſcertain the duties and privileges of that uſeful order of citizens.

Decurio was alſo a name given to certain prieſts intended, as it ſhould ſeem, for ſome particular ſacrifices, or other religious ceremonies; or for the ſacrifices of private families and houſes, as Struvius conjectures, who thence derives their name.

Be the origin of the name what it will, we have an inſcription in Gruter, which confirms what we have ſaid of their function: ANCHIALVS. CVB. AED Q TER. IN. AEDE. DECVRIO. ADLECTVS. EX. CONSENSV. DECVRIONVM. FAMILIAE. VOLVNTATA. This inſcription proves that there was a decurio in the houſe of a private perſon, Q. Terentius.

DECURION, in the armies of the ancient Roman empire, was an officer who held command over ten men, as the centurion did over an hundred. The ſyſtem of dividing their forces into very ſmall parties, each under the particular charge of an expert and approved individual, was a chief ſupport of the great power the Romans acquired over their neighbours. Military men of eminence, in our own country, have ever conſidered the diviſion of a company into very ſmall parties, each commanded by a non-commiſſioned officer, to be highly conducive to effect in the moment of conteſt; eſpecially among new levies, which are apt to be too impetuous. Hence it has been remarked that old regiments ſtand a charge with moſt coolneſs and obſtinacy; while the aſſault made by a new regiment, generally compoſed of young, ardent, and vigorous individuals, is moſt impreſſive. The plains of Maida give us a recent inſtance of a new corps making its *debut* with the defeat of nearly treble its numbers of French veterans, who could not ſtand the bayonets of the gallant ſecond battalion of the 78th, juſt raiſed in the Highlands.

It would be difficult to ſtate which of the modern ranks of ſerjeants or corporals, tallies with moſt general conformity to the ancient rank of decurion; the number of men they command being unſettled, as they uſually act according to the occaſion of the moment; and perform the general duty of the company in turn, without having charge of any particular individuals, abſtracted from the reſidue. It appears obvious, that, in this reſpect, our ſyſtem is rather deficient, and admits of a very eaſy remedy.

DECURRENTIA Folia, in *Botany*. See Leaf.

DECURSIO, in *Roman Antiquity*. See Campicursio.

DECURY, ten perſons ranged under one chief, or leader, called the decurio.

The Roman cavalry was divided into decuries.

Romulus divided the whole Roman people into three tribes over each of which he appointed a tribune: each tribe he ſubdivided into ten centuries, with centurions at their heads; and each century he ſubdivided farther into ten decuries, over each of which a decurio commanded. See Curia.

DECUSSATA Folia, in *Botany*. See Leaf.

DECUSSATION, in *Geometry* and *Optics*, the points wherein two lines or rays croſs or interſect each other: or the action itſelf of croſſing.

The rays of light decuſſate in the cryſtalline, before they reach the retina.

Decussation *of the Nerves*, in *Anatomy*. The optic nerves, ariſing ſeparately from the right and left ſides of the brain, approach each other, and unite together before leaving the ſkull. Their united portion lies juſt in front of the ſella turcica, and the right and left nerves paſſing from this, go through their reſpective foramina optica into the orbits. Anatomiſts have doubted whether or not the nerves decuſſate at this united part; ſo that the nerve ariſing from the right optic thalamus ſhould belong to the left eye, and *vice verſâ?* A direct examination of the part in queſtion is not ſufficient to determine this point: the ſubſtance of the right and left nerves is completely blended at the point of junction, but whether they croſs cannot be aſcertained. In ſeveral inſtances of diſeaſe and injury affecting one eye of an animal, the optic nerve of the diſeaſed ſide has been found diminiſhed in ſize, and altered in appearance, as far as the united portion; and theſe changes have there been continued towards the oppoſite thalamus: in ſome fiſhes they obviouſly croſs each other: in the ſkate, the right nerve goes through a fiſſure of the left; and in bony fiſhes the nerve lies on the other without any intermixture. Theſe facts are ſtrongly in favour of the ſuppoſed decuſſation in the human ſubject. An explanation of the circumſtance of our ſeeing objects ſingle with two eyes, has been ſought in this decuſſation; but, if it be admitted, we do not ſee that the phenomenon becomes more intelligible.

From

From the circumſtance of injury of one ſide of the brain generally producing paralyſis of the oppoſite ſide of the body, ſome have inferred that all the nerves decuſſate; ſo that the right ſide of the body, according to this opinion, has its nerves from the left ſide of the brain, and *vice verſâ*. The arguments from direct anatomical inveſtigation would certainly be completely againſt ſuch an opinion, as we diſcover nothing like a decuſſation of that ſort. We are ſo totally ignorant of the *manner*, in which the mind is affected, and of every thing that relates to the chain of connexion uniting external objects and the ſenſitive faculty, that we need not be ſurpriſed at not being able to explain any particular phenomena in this department of phyſiology. We have no more reaſon to infer that preſſure on one ſide of the brain ſhould affect the ſame ſide of the body, than that it ſhould paralyſe the oppoſite parts; and any inveſtigation of the reaſon why the latter event ſhould take place, will probably avail us no more than our attempts to explain how it is that we ſee objects upright, when they are painted on the retina in an inverted ſtate, in conſequence of the decuſſation of the rays of light in their paſſage through the cryſtalline lens. See S. T. Soemmerring and Noethig Diſſert. de Decuſſatione Nervorum Opticorum. Mogunt. 1796.

DECUSSIS, a Roman coin, which had different values. At firſt it was worth ten as, under Fabius ſixteen, and under Auguſtus twelve.

DECUSSORIUM, a ſurgeon's inſtrument, wherewith the dura mater is preſſed down in trepanning, to ſecure it from damage in the operation.

DECZ, or DEEZ, in *Geography*, a town of Tranſylvania, on the river Samos; 7 miles N.W. of Samoſvivar.

DEDARD, a town of Tranſylvania; 8 miles W. of Kereſztier.

DEDDINGTON, a market town in the hundred of Wootton, Oxfordſhire, England, is ſeventeen miles diſtant from Oxford, and ſixty-nine N.W. from London. It is an ancient town, was incorporated, and ſent members to parliament in the reigns of Edward I. and Edward III. It has long loſt that privilege, and is at preſent governed by a bailiff. Dr. Plot, in his Hiſtory of the County, informs us, that Deddington had once a caſtle, in which the earl of Pembroke left the famous and unfortunate favourite of Edward II., Piers Gaveſtan, under a ſtrong guard; where he was ſurpriſed by the earl of Warwick, and hurried away to Black-low hill for execution. The town is tolerably well built; and the church is a good ſtructure, having a very neat tower. Sir Thomas Pope, who was born here, A. D. 1507, and died in 1558, founded a free-ſchool, called Jeſus ſchool; before he gave the manor to Chriſt church college, Oxford. The canal from Birmingham to Oxford paſſes near the town, on which is a wharf for landing of coals to ſupply the inhabitants: an article which, previous to that communication being made to the Staffordſhire collieries, was often ſcarce and extremely dear. The place is famous for brewing excellent malt-liquor; hence it has obtained the appellation of Drunken Deddington. It has a market weekly on Saturdays, and three annual fairs. According to the returns under the late act, the number of houſes was 232, and of inhabitants 1172.

In the neighbourhood of Deddington are two mineral ſprings, celebrated for their medicinal virtues. One of them has a ſtrong ſulphureous ſcent, and contains a conſiderable portion of hepar ſulphuris, mixed with other ſulphuric neutral ſalts; and its waters produce ſimilar good effects in ſcrophulous caſes, to thoſe of Harrowgate Spaw in Yorkſhire.

DEDELER, a town of Aſiatic Turkey, in the province of Caramania; 21 miles N.W. of Cogni.

DEDHAM, a large village of Eſſex, in England, was formerly a market town of ſome note, and famous for its clothing trade, as early as the reign of Richard II. Here is a free grammar ſchool, which was endowed by William Littlebury, gent. in the year 1570, for the education, &c. of twenty ſcholars. The donation was confirmed, and the governors incorporated by a charter of queen Elizabeth, dated May 14, 1574. According to the late population act of parliament, Dedham contained, in 1800, 303 houſes, and 1537 inhabitants. This town is 20 miles N.E. by E. from Colcheſter, and 58 miles N.E. by N. from London.

DEDHAM, a poſt-town of America, and the capital of Norfolk county, in the ſtate of Maſſachuſetts, called by the Aborigines Tiot, and by the firſt ſettlers Clap board Trees. This townſhip was incorporated in 1637; it is ſeven miles long, and ſix broad, and contains 1973 inhabitants. Its public buildings are, three congregational churches, an epiſcopal church, a court-houſe, and a gaol. Its ſituation is pleaſant, 11 miles S.W. of Boſton, on Charles' river. A ſmall ſtream, which joins Neponſit river, on the borders of Milton, furniſhes water for two griſt-mills, two ſaw-mills, two fulling-mills, and a leather-mill; and in this place is a wire-manufactory, which ſupplies the fiſh-hook and card-manufacturers of Boſton.

DEDI, in *Conveyances*, imports a warranty given to the feoffee and his heirs. See WARRANTY.

DEDICATION, the act of conſecrating a temple, altar, ſtatue, place, &c. to the honour of ſome deity. See TEMPLE, ALTAR, CHURCH, &c.

The uſe of dedications is very ancient, both among the worſhippers of the true God, and among the heathens: the Hebrews call it חנכה, *hhanuchah, initiation;* which the Greek tranſlators render εγκαινια, and εγκαινισμος, *renewing*.

In the Scripture we meet with dedications of the tabernacle, of altars, of the firſt and ſecond temple, and even of the houſes of private perſons. (Numb. vii. 10, 11. 84. 88. Deut. xx. 5. 1 Kings, viii. 63. 2 Chron. vii. 5. 9. Ezra, vi. 16, 17. 1 Eſd. vii. 7. Pſalm, xxx. 1. Heb. ix. 18.) There are alſo dedications of veſſels and garments of the prieſts and Levites, and even of the men themſelves.

Under the Chriſtian diſpenſation, we call the like ceremonies conſecrations, benedictions, ordinations, &c. and not dedications, which term is only applied to places, as to a church; and is properly the conſecration thereof performed by a biſhop, and a number of ceremonies preſcribed by the church. See CONSECRATION.

The Chriſtians, finding themſelves at liberty under Conſtantine, in lieu of their ruinous churches, built new ones in every place; and dedicated them with a great deal of ſolemnity. The dedication was uſually performed in a ſynod; at leaſt they aſſembled a number of biſhops, to aſſiſt at the ſervice. We have the deſcription of thoſe of the churches at Jeruſalem and Tyre, in Euſebius, and many others in later writers.

In the Sacramentary of Gelaſius, the dedication of the baptiſtery is delivered ſeparately from that of the church, which was performed with leſs ceremony than at preſent. The Feaſt of the Dedication, or rather the feaſt day of the ſaint or patron of a church, called, in our law-books, *dedicatio*, was celebrated not only by the inhabitants of the place, but by thoſe of all the neighbouring villages, who uſually reſorted thither; and ſuch aſſemblies were authoriſed by the king.

king.—"Ad dedicationes, ad fynodos, &c. *venientes* fit fumma pax."

The cuftom is ftill retained, in diverfe places, under the name of feafts, wakes, or vigils.

Popes Felix and Gregory are the firft that decreed the annual obfervation of the dedication of churches, fince our Saviour's time, which have been obferved in England under the name of wakes or revels; but they were the occafion of much idlenefs and debauchery, fo that king Henry VIII. A. D. 1536, reftrained them all to the firft Sunday in October, prohibiting their being kept on any other day; and afterwards, by the ftatute 5 and 6 Edward VI. c. 3. of holy-days, they were totally abolifhed. But thefe feafts being again revived by degrees, in fundry places of this realm, and particularly in Somerfetfhire, judge Richardfon, when he was on the circuit, at the requeft of the juftices of peace for the county, publifhed an order for fuppreffing them; but he was obliged the next year as publicly to revoke it, and to declare fuch recreations to be lawful; and as a farther punifhment on the judge, archbifhop Laud obtained his removal from that circuit. In anfwer to a letter written by Laud to Pierce, bifhop of Bath and Wells, in which he requires fuller information on this fubject, the bifhop acquaints him, that the late fuppreffion of the revels was very unacceptable, and that the reftitution of them would be very grateful to the gentry, clergy, and common people; in proof of which he had procured the hands of 72 of his clergy, in whofe parifhes thefe feafts were kept; and he believes that if he had fent for 100 more he fhould have had the fame anfwer from them all; but thefe 72 (fays his lordfhip) are like the 72 interpreters, that agreed fo foon in the tranflation of the Old Teftament into Greek. He then proceeds to explain the nature of thefe feafts. The feafts of dedication, fays he, are in memory of the dedication of their feveral churches; thofe churches which are dedicated to the Holy Trinity, have their feafts on Trinity Sunday; and fo all the feafts are kept upon the Sunday before or after the faint's day to whom the churches are dedicated, becaufe the people have not leifure to obferve them in the week-days:—this, fays his lordfhip, is acceptable to the people, who otherwife go into tipling-houfes, or elfe to conventicles. (See *Church*-Ales.) It was one of the charges againft Laud at his trial, that he encouraged thefe revels; and it was alleged, that they were the occafion of many diforders, as drunkennefs, quarrelling, fornication, and murder; and that, therefore, it was very unlikely they fhould anfwer any good purpofe, and that they were unfit to fucceed the public devotions of the Lord's day.

The Jews celebrated the anniverfary of the dedication of their temple every year, for eight days; this was firft enjoined by Judas Maccabæus, and the whole fynagogue, in the year of the Syro-Macedonian æra 148, *i. e.* 165 years before Chrift, on occafion of the victory obtained by the Maccabees over the Greeks. (1 Maccab. iv. 59.) It begun every year on the 25th day of Cifleu, and was continued to the 8th day, during all which time they illuminated their houfes, by fetting up candles at every man's door, whence it was called the feaft of lights. This feftival Chrift honoured with his prefence at Jerufalem. (John, x. 22.) Leo of Modena fays, that they begun with one lamp, and added to the number, according to the day of the feaft; fo that on the laft day they had eight lamps in their houfes. Perfius feems to refer to this feftival in his 5th fatire, v. 179—184; and it is poffible, that the Maccabee feftival, of the dedication of the altar, and the commemoration of the inauguration of Herod the Great, might be blended together at the time to which Perfius refers. This coincidence, which is not improbable, accounts for the fplendour of the illuminations, which he defcribes.

The heathens had alfo dedications of temples, altars, and images of their gods, &c. Nebuchadnezzar had a folemn dedication of his ftatue. (Dan. iii. 2.) Pilate dedicated gilt bucklers at Jerufalem, to Tiberius. (Philo de Legat.) Petronius would have dedicated a ftatue to the emperor in the fame city. (Ibid. p. 791.) Tacitus (Hift. lib. iv. cap. 53.) mentions the dedication of the Capitol, upon rebuilding it by Vefpafian, &c.

Thefe dedications were performed with facrifices proper to the deity they were offered to; but they were never practifed without public permiffion. Among the Greeks, it does not appear who gave that permiffion; but among the Romans, it was always the magiftrate.

The heathens had fimilar anniverfaries with the Jews, as that of the dedication of the temple of Parthenope, mentioned by Lycophron. The heathen temples were dedicated with many ceremonies, the principal of which were the following. The pontiffs and people encompaffed the temple with garlands and feftoons of flowers; the veftal virgins, holding branches of olive trees in their hands, fprinkled the outfide of the temple with the luftral water; then the perfon who confecrated, being the prætor, cenfor, &c. drew near the gate with a pontiff at his fide, who directed him in pronouncing the words of confecration: after which they facrificed a beaft in the court of the temple, and anointed a ftatue of the deity to whom it was dedicated with oil, and laid it on a pillar rubbed with oil. An infcription was afterward made on fome part of the temple, according to the name of the perfon who performed the office, and the year of dedication, which they annually obferved by a facrifice, or fome other folemnity.

Dedication, in *Literature*, is an addrefs prefixed to a book, foliciting patronage, or teftifying refpect for the perfon to whom it was made. The dedication of the fourth part of Mr. Edwards's Hiftory of Birds, is curious: "To God! the one eternal! the incomprehenfible! the omniprefent! omnifcient and Almighty Creator of all things that exift! from orbs immeafurably great, to the minuteft points of matter, this atom is dedicated and devoted, with all poffible gratitude, humiliation, and worfhip, and the higheft adoration both of body and mind, by his moft refigned, low, and humble creature, G. E."

DEDIMUS Potestatem, in *Law*, a writ whereby commiffion is given to one or more private perfons, to affift for the expedition of fome act belonging to a judge.

The civilians call it delegatio: it is granted moft commonly upon fuggeftion, that the party who is to do fomething before a judge, or in a court, is fo weak that he cannot travel.

Its ufe is various: as, to take a perfonal anfwer to a bill in chancery; to examine witneffes, or to levy a fine, &c.

DEDUCTION, in *Commerce*, a fubtracting, or retrenching a little fum paid, from a greater remaining to be paid.

Deduction, in *Logic* and *Science*, denotes a procefs or chain of reafoning, whereby, from principles fuppofed and allowed, we arrive at the truth of any propofition. See Reasoning.

DEDUCTOR, in *Antiquity*, a client, who, befides the ordinary ceremony of faluting his patron every morning, was likewife obliged to attend him on public occafions. Pitifc. Lex. Antiq. in voc.

DEDUCTIONE,

DEDUCTIONE, or DEDUTTIONE, in the *Italian Music*, the name which Guido Aretine gave to the rise of the voice, in pronouncing the syllables *ut, re, mi, fa, sol, la: quia per has deducitur vox.* On the contrary, when the voice descended by *la, sol fa, mi, re, ut,* he called it Reduttione, quia per has reducitur vox.

DEDUCTIVE EVIDENCE, in *Ethics*, is derived either from the invariable properties or relations of general ideas, or from the actual, though perhaps variable, connections subsisting among things. The former is called demonstrative, and the latter moral. These differ from one another with respect to their subject; with respect to their nature, as the one admits of degrees and contrariety of proofs, which the other does not, and as the former is simple, arising from a coherent series of proofs mutually and essentially connected, and the latter is generally complicated, being compofed of a number of independent proofs. Campbell's Hist. Rhet. vol i book i. chap. 5.

DEE, JOHN, in *Biography*, an English divine and mathematician, was born in London, in 1527. He received the early part of his education at different schools in and near the metropolis; from thence he went to St. John's college, Cambridge, where he applied himself to the usual studies with much diligence. In 1547 he visited Flanders; and, on his return, was chosen fellow of Trinity college, and was admitted to the degree of M. A. His knowledge of mathematics, and his perpetual observations on the face of the heavens, drew upon him the imputation of a conjurer, which was never afterwards obliterated. To avoid the notice which evil-minded persons excited by reports equally malicious and unfounded, he withdrew to Louvain, where he obtained a doctor of laws' degree. From Louvain he went to Paris, and read lectures on Euclid's Elements with much applause. In 1551 he returned to England, and was introduced to the king, who gave him a pension of 100 crowns, which in a short time was commuted for a royal presentation to the rectory of Upton-upon-Severn. In the reign of Mary, he was charged with practising enchantments against the queen's life, and it was not till after much expence, trouble, and an imprisonment, that he was set free. In the succeeding reign he received better treatment. He was consulted as to the most propitious day for celebrating the coronation, and his supposed skill in this instance obtained for him a high degree of credit from the principal characters at court, and even from the queen herself, who at length took him into her service, and did him the honour of becoming his scholar. In 1564 he went on the continent to present a work, entitled, "Monas Hieroglyphica," to the emperor Maximilian. His next work, "Propedumata Aphoristica," he presented to his own sovereign in 1568, and in two years after he published a preface to sir Henry Billinsley's translation of Euclid, to which edition he added many notes of his own. In 1571 he went again to Louvain, where he was attacked by a serious and alarming illness, which afforded the queen an opportunity of shewing her regard and respect for him who had formerly been her instructor in astrology. She sent out two physicians to attend him, and exhibited other marks of her beneficence. On his return he settled at Mortlake, in Surry. Here he collected a valuable library, and an astronomical and chemical apparatus, the greater part of which was destroyed by an ignorant mob, who conceived that the owner had secret dealings with the devil. In the year 1572, on the sudden appearance of a new star in Cassiopeia's chair, and again in 1577, on the appearance of a comet, which was looked on as foreboding some terrible calamity, Mr. Dee obtained the highest reputation for the discourses which he delivered explanatory of the celestial phenomena. The queen's ill health in the following year afforded her a pretext for sending Dee to Germany, to consult some eminent physicians on her case; though he probably was deputed on a political errand. He was next employed to draw a geographical description of the countries discovered by Englishmen in different parts of the globe: this is still preserved in the Cottonian library, on two large rolls. He now composed a treatise on the reformation of the calendar, which was highly esteemed by the best mathematicians of the age, and still exists in MS. at the Ashmolean museum, Oxford. Hitherto, notwithstanding the popular clamour excited against Mr. Dee, his conduct was respectable, and his character estimable. But now he seems to have persuaded himself that an intercourse might, by the occult sciences, be maintained with the inhabitants of another world. He connected himself with a man of the name of Kelley, and they united in performing their incantations, and maintaining an imaginary intercourse with spirits, until, from their neglect of every duty attached to life, they were reduced to circumstances of want and great distress. In the year 1583, they admitted a Polish nobleman into their society; and after they had nearly exhausted all his resources, they went, to avoid his creditors, to Poland, and from thence to Bohemia. Dee contrived to obtain an audience with the Polish sovereign, and the emperor Rodolph, both of whom he disgusted by his own self-importance, and by a parade of projects which he was incapable of realizing. Dee and Kelley separated, and the latter made himself master of the most valuable part of their stock, by which he was enabled to establish his future fortune. Dee returned to England in the year 1589, and, through the interest of the queen, obtained some preferment in the church, with promise of higher honours, and more lucrative posts, which he never obtained. His manners were haughty, his temper unconciliating, and, on account of his supposed commerce with infernal spirits, he became the object of hatred to those with whom he was obliged to associate. He petitioned for trial, in hopes of being able to free himself from the suspicions attached to his character as a necromancer; but his prayer was not regarded, and he felt himself in old age without friends, and overwhelmed in poverty. He died in 1608, while he was preparing for another journey to the continent. The works of Mr. Dee were numerous; but they are now well nigh forgotten. Some unpublished MSS. are still preserved in the Ashmolean and Cottonian collections, which are said to exhibit evident proofs of the author's erudition and diligence, as well as display abundance of vanity and fanaticism. Biog. Brit.

DEE, ARTHUR, son of John, born at Mortlake, in Surry, July 14th, 1579, accompanied his father in his travels over France, Germany, and Poland, and was early initiated by him in the same mysteries which he himself had so unfruitfully followed. Returning to England, he settled in Westminster, intending to practise medicine there; but, being rejected by the college of physicians, to whom he applied for a licence, he went to Russia, and, on the recommendation of king James, was appointed physician to the czar, an office he continued to hold for fourteen years. He now returned to England, where he soon lost the money he had acquired in Russia, in search of the grand elixir, the reality of the existence of which he never doubted. He is said to have died at Norwich in extreme poverty, in September, 1651. He suffered the censures of the college of physicians, Goodall says, for hanging out a table at his door, exposing to sale several medicines, by which he professed to cure sundry diseases. While at Paris, he published, in 1631, "Fasciculus chymicus, abstrusæ scien-

tiæ Hermeticæ, ingreffum, progreffum, coronidem explicans," 12mo. Eloy Dict. Hift.

Dee, in *Geography*, a river that rifes in the mountains of Merionethfhire, in North Wales, runs through Pimblemere, near Bala, and after an extenfive circuit through the county of Denbigh, which it feparates from Chefhire, paffes by Chefter, almoft encircling it, and after flowing to the weft, through an artificial canal formed by the river Dee company, difcharges itfelf into the Irifh fea, about 15 miles N.W. from that city. It is navigable for fhips of 200 tons burthen up to the city of Chefter. See Canal. Near to Parkgate, on the northern fhore of the eftuary of this river, coals are dug. The freight of goods by means of this river and the ocean, would, it is faid, be much cheaper between Chefter and Liverpool, than by the nearer route of the Wirral branch of the Ellefmere canal and the river Merfey, were it not for the coaft-wife duties which all goods are obliged to pay in paffing between the mouths of the Dee and Merfey rivers. The waters of this river were regarded as facred and purifying by our Britifh anceftors.

Dee, a river of Scotland, which rifes in the N.W. part of Kircudbrightfhire, from Loch Dee, and runs into Solway Frith, about five miles below Kircudbright. It is rather an eftuary in the part which is navigable for about fix miles from its opening into the fea.—Alfo, a river of Scotland, which rifes in the borders of the county of Invernefs, and runs into the German ocean at Aberdeen. It feparates Aberdeenfhire from the county of Mearns, and is navigable from its mouth at the harbour of New Aberdeen, to the new ftone bridge about fix miles above this, which was erected in the year 1801 over this river, with a principal arch of 100 feet fpan: about the fame time the earl Fife propofed to clear the bed of this river upwards to the foreft of Mar, fo as to float the timber thereof down to new Aberdeen harbour. See Canal. On this river is the moft extenfive falmon-fifhery in Scotland.

Dee, a fmall river of Ireland, which, rifing in the county of Meath, enters Louth, croffes it from weft to eaft, and falls into the bay of Dundalk. The town of Atherdee or Ardee is fituated on it, and hence derives its name, which fignifies *a ford over the Dee*.

Dee, or *Dee-obba*, a fmall but clear river of Abyffinia, which runs into the Nile between Abbo and Eion Mariam, about 25 geographical miles above the fource affigned to it by Mr. Bruce. N. lat. 11° 25′. E. long. 36° 51′.

DEEAZED, in *Agriculture*, a provincial term which is applied to any fort of plant or animal which is much injured or deftroyed by the operation of cold, fuch as vegetables which are nipped by froft, or chicks which die in the fhell of the egg, in confequence of the abfence of the hen.

DEED, Factum, in *Law*, fo called, κατ' ἐξοχὴν, by way of eminence, becaufe it is the moft folemn and authentic act which a man can poffibly perform, with refpect to his property, is an inftrument written on paper, or parchment, the validity of which confifts in the following particulars; proper parties to contract with one another, and a proper fubject matter to be contracted for; a good and fufficient confideration; writing on paper or parchment duly ftamped; fufficient and legal words properly difpofed, comprehending the premifes, the *habendum* and *tenendum*, the terms of ftipulation, a condition, a claufe of warranty, and the conclufion, mentioning the execution and date of the deed; reading, if defired, before the execution; fealing; and by ftat. 29 Car. II. cap. 3. in many cafes figning alfo; and delivery; and which comprehends a contract, or bargain, between party and party.

If a deed wants any of the forementioned requifites, it is void *ab initio*; and it may be alfo avoided by matter *ex poft facto*; as by rafure, interlining, or alteration in any material part, without a memorandum made at the time of execution and atteftation; by breaking off or defacing the feal; by delivering it up to be cancelled; by the difagreement of fuch whofe concurrence is neceffary; and by the judgment and decree of a court of judicature.

Of thefe there are two forts; deeds indented, and deeds poll; which denominations arife from the form and fafhion thereof; the one being cut in and out in the top, or fide, called indented; inftar dentium, in acute angles, but at prefent in a waving line; and the other plain, or polled.

A deed indented, or an indenture, confifts of two parts, or more (for there are tripartite, quadripartite, feptempartite, &c. deeds); wherein it is expreffed that the parties thereto have to every part thereof interchangeably fet their feveral feals. The caufe of their indenting is, that whereas the feveral parties have each of them one, the indenture may make it appear, that they belong to one and the fame contract by their tallying. See Indenture.

A deed poll, or polled, anciently called charta decima parte, or charta fimplex, is a plain deed, without indenting; ufed when the vendor, for example, only feals, and there is no need for the vendee's fealing a counter-part, becaufe the nature of the contract is fuch, that it requires no covenant from the vendee.

Deed, *date of a*. See Date.

Deeds, *ftealing of*. See Larciny.

DEEL, in *Geography*, a fmall river of Ireland, in the county of Mayo, which flows into the northern part of lough Conn.

Deel-*Caftle*, a fmall poft-town of Ireland, in the county of Mayo, 134 miles N.W. from Dublin, on the road from Caftlebar to Killalla, and about five miles from the latter place.

DEEMSTERS, or Demsters. All controverfies in the Ifle of Man are decided, without procefs, writings, or any charges, by certain judges, chofen yearly from among themfelves, called deemfters. This inftitution they are fuppofed to owe to the ancient Druids.

The word is formed from the Saxon *dema*, *judge*, or *umpire*.

There are two deemfters for each divifion of the ifland: in ancient court-rolls, they are called jufticiarii domini regis. They fit as judges in all courts, either for life or property; and with the advice of the twenty-four keys, declare what is law in uncommon emergencies.

DEENKOTE, in *Geography*, a town of Hindooftan, in the country of Lahore, feated on the eaft fide of the Indus, or Sinde, at its junction with the Cow river, from 30 to 35 geographical miles below Attock, where is a pafs acrofs that river.

DEEP, is a term frequently applied in the facred writings to the ocean; the Great Deep, mentioned by Mofes in his account of the Noetic Deluge, (Gen. vii. 11.) has been fuppofed by Dr. Woodward (Nat. Hift. of Earth, p. 117.) to mean "a mighty collection of water inclofed in the bowels of the earth, conftituting an huge orb in the interior or central parts of it; upon the furface of which orb of water, the terreftrial ftrata are expanded." Under the article Continent, we have endeavoured to fhew, that the central parts of the earth are not only folid, but of much greater fpecific gravity than the fuperficial ftrata of the earth; and, indeed, if we confult the Mofaic account of the decreafe of the waters of the fame deluge, (Gen. viii. 2.) we fhall find the word deep only ufed, as in numerous other places, where the fea upon the furface of the earth is intended to be underftood. See Abyss.

Deep, or *Grave*, in *Music*, signify such tones as are low or vibrate slowly, as a deep voice, deep tone, deep pitch, &c.

Deep-*Bay*, in *Geography*, a bay on the east coast of the island of Antigua; one mile S. of Green island.

Deep-*Cutting*, in *Canal-making*, is where the canal is cut or dug of an unusual depth; this frequently occurs on summits for avoiding tunnels or subterraneous canals, or to shorten the course at the projecting points of long hills. Some stupendous works of this kind are described under our article Canal, which see.

Deep-*River*, in *Geography*, a river of America, in N. Carolina, which rises in Wachovia, unites with Haw river, and forms the N. W. branch of Cape Fear river.

Deep-*Sea-line*, or Dip-*Sea-line*, in the *Sea Language*, a small line used for sounding, when a ship is in very deep water at sea.

At the end of this line is a piece of lead, called the deep-sea lead, at the bottom of which is a coat of white tallow, to bring up stones, gravel, shells, or the like, from the bottom; in order to learn the differences of the ground; which being entered, from time to time, in the seamen's books, by comparing of observations, enable them to guess by their soundings, &c. what coasts they are on, though they cannot see land.

Deep-*Waisted*, in *Naval Architecture*, denotes the structure of a ship's deck, when the quarter-deck and fore-castle are elevated from four to six feet above the level of the upper-deck, so as to leave a vacant space, called the waist, on the middle of the upper-deck.

DEEPING-Market, or *Market-Deeping*, in *Geography*, so called to distinguish it from other places named Deeping in this county, is a small market-town in Lincolnshire, England. The land to the east of it is said to be the lowest in the whole county. Ingulphus, in his history of Croyland, observes, that Deeping signifies a low meadow. He also states, that Richard de Rulos, chamberlain to William the Conqueror, raised a lofty artificial bank to confine the waters of the river Welland, which before used frequently to overflow; and on this bank was erected a number of houses, which formed a large village. Of this place, however, an earlier notice appears on record; for Morcar de Bruen, a valiant soldier in the time of the Saxons, gave to the abbey of Croyland the manor of Deeping, with its appurtenances; which grant was confirmed by Beorred, king of Mercia, in a charter dated the eighth of the kalends of August, A. D. 860. The town has a market on Thursdays, and five annual fairs. It is distant from London 90 miles N. The number of inhabitants returned under the late act was 803, occupying 172 houses.

In this town was born Dr. Robert Tighe, archdeacon of Middlesex, who, being an excellent linguist, was one of the persons employed to revise and correct the translation of the Bible.

In the vicinity of Market-Deeping are two villages, respectively called East and West-Deeping, from their relative situation to the town; and also a large tract of marsh land, called Deeping-Fen; the latter comprehends about 5000 acres, which are inclosed from fens belonging to several parishes, and free from all ecclesiastical demands, land-taxes, and other assessments. By act 16 Charles II., special provision is made for the maintenance of the poor of this district, who are never to become chargeable to the respective parishes in which they may reside.

DEER, a township of America, in the state of Pennsylvania, and county of Alleghany, containing 587 inhabitants.

Deer, an island and township in Penobscot bay, in the county of Hancock, and district of Maine, containing 1094 inhabitants. It was incorporated in 1789, and lies about 8 miles S. E. of Castine.—Also, an island in Passamaquoddy bay.

Deer, in *Zoology*. See Cervus.

The common deer is more preserved in England than in any other part of the world, and carries its distinction from the red-deer, in its size, and in the falcated figure of its horns. See Cervus.

They are said to have been first introduced here by king James I. out of Norway, who first brought them into Scotland, and from thence into his chaces of Enfield and Epping. They are scarcely known in France, but are sometimes found in the north of Europe. In Spain they are extremely large: they are met with in Greece, the Holy Land, and China; but in every country, except our own, are in a state of nature, unconfined by man.

We keep several species of these, however, and may, perhaps, increase them in some sort to many more, as they are very salacious animals, and will be apt to mingle one species with another. The principal kinds we know at present, are the Spanish deer, the mottled deer, the Virginia deer, and a species which have their hinder hoofs marked with white on the outside; the ears and tails of these are long, their horns branched, and their forehead a little depressed or hollow between the eyes. These will eat bread, fruits, and any thing that is offered them, and are often beautifully variegated; many of them have black variegations, and a black list down their back, with a series of white spots on each side; others are so beautifully marked with white spots and other variegations, as to equal the zebra in beauty: these they call menaled-deer. Ray.

The method of hunting deer in the island of Ceylon is very particular. The huntsmen go out in the night, and only two usually go together; the one of these carries upon his head an earthen vessel, in which there is some fire burning and flaming; the ingredients are generally small sticks cut into pieces, and common rosin; of this the other man carries a supply about him to replenish the pot when it becomes low. The person who has the fire upon his head carries in one hand a staff, on which there are fixed eight bells, and the larger these are the better. This man goes first into the woods, and the other follows close behind, with a spear in his hand. As soon as the deer hears the noise of the bells, he turns towards the place whence the sound comes, and seeing the fire, he eagerly runs up to it, and stands gazing at a small distance; the second man has then nothing to do but to kill him with the spear, for he sees neither of them.

Not only deer, but elks, and even hares, are thus taken; for they gaze at the fire, and never see the men. The profits of this sort of hunting are very large, without any danger: for though there are great numbers of tygers, elephants, and wild boars in those woods, the huntsmen are in no danger of them while the fire burns, for they all run away from it. Phil. Trans. N° 278. p. 1094.

The deer is a class of animals which has but lately engaged the attention of the farmer, in the idea of deriving profit from it.

It has been noticed in the Survey on Agriculture for the county of Perth, that "the red-deer is a species which is not so numerous in that part of the country at present as it was formerly, though there are still some remains of them. Likewise, that the roe-buck and doe are met with in many parts of the county, almost in every district, which is not divested of wood; and although no sanctuary is allotted them, like the deer, they live nearer to the habitations of men;

men; but always in the neighbourhood of extenſive and ſolitary woods, to which they may flee in the hour of danger."

It is ſtated by the ſame writer that, "the deer, like other cattle, riſe in the bone by good keeping; and the breed degenerates when the paſture is poor. When the deer enjoyed the extenſive range of the moſt fertile vallies, and were fed undiſturbed, by the moſt luxuriant graſs, he ſuppoſes they muſt have been larger in both horn and hoof, than at preſent, while baniſhed to the receſſes of the higheſt mountains, and compelled to live on ſuch coarſe fare as they can find on the mountain's brow."

Theſe animals are well ſuited as ſtock for large parks and other ſimilar grounds; and it is ſuggeſted, in the report noticed above, that there are no "ſpecies of tame animals that are more elegant in their appearance, if they be well ſelected, than the fallow deer, or better ſuited for occupying an extenſive lawn, which ſtretches round the caſtle of a great man."

It is remarked in the Report on Agriculture for the County of Hertford, that "the earl of Clarendon, juſtly conſidering that there is no more impropriety in converting one animal to profit than another, makes deer an object of huſbandry. As ſoon as the rutting ſeaſon is over, or uſually about the tenth of November, his Lordſhip ſelects from the herd, the weak ones, ſome of which would probably die in the winter, and keeps them in a ſmall yard that has a ſhed on one ſide, and a net over the whole, againſt pigeons, &c.; the ſpot very warm and well ſheltered. Their horns are immediately ſawn off, the place is well littered, and they are fed at a very ſmall expence, on pea ſtraw, hay, &c. warmth making up for the want of better food. At times during the winter, they have clover hay cut into chaff, and if they do not eat it well, a little ſalt is added. They have always plenty of water, and are kept perfectly clean: much attention ſhould be paid by the keeper, to make himſelf familiar with them, that he may enter the place without diſturbing them. The firſt week in March he gives them oil cake; about half a cake each a day, with chaff, which fattens them ſo quickly, that all are gone in May. Before killing, they have ſome green meat given, to take away any ill flavour from the cake, ſuppoſing ſuch to be the effect of the food, for it is certain that the veniſon is exceedingly good. As to weight, a haunch uſually weighs about twenty-four pounds; a brace are ſold for fifteen guineas: the ſkin worth 2*l.* 2*s.* is the keeper's perquiſite; ſo that the value of a brace amounts to 17*l.* 17*s.* excluſive of ſome trifling articles. The purchaſer ſends for them. His lordſhip uſually fattens nine brace: his whole winter ſtock riſes to three hundred and fifty head, in a park of two hundred and fifty acres, but much of it is thickly covered with timber; thirty ſheep, and ten cows alſo feed in it. The park conſumption of hay amounts to thirty-two loads, being reduced to that quantity by the uſe of much browſe; all aſh, elm, and Scotch fir, being brought for that purpoſe before faggoting, which not only ſaves hay, but improves the flavour of the veniſon."

The writer of the work mentioned above ſtates in addition that he had, "from various information, conceived that breeding deer for ſale was a very unprofitable buſineſs; but the circumſtance ſtated in this account, of ſelecting ſuch as would probably die, or be unprofitable to keep, places the eſtimate of advantage in quite a new light: thus conſidered he thinks, the ſpeculation ſeems a profitable one. It is not uncommon to hear of great winter loſſes of deer in parks, for want of a ſyſtem in which ſuch can be applied to advantage: nothing of this ſort can be well done, that is not in a regular courſe; but, by this practice, every deer which, from ſeverity of ſeaſon, or from accident, would be loſt, is converted to a great profit; as in ſuch caſes the expence of fattening is a trifle, the greater burthen of bringing them to an age for ſale, not belonging to the account of this ſyſtem. Some, it is obſerved, have fattened well, that have had their legs broken by accident."

Mr. Young remarks that, on the manure being mentioned, he made the common objection, that deer's dung is good for nothing; but this lord Clarendon conceives to be a great error: his lordſhip had an experiment made to aſcertain it; he manured for turnips, two lands; one with ſtable dung, one with deer's dung, and he left a third without manure; the two manured were nearly equal, if any difference, it was in favour of the deer; the other of courſe was much inferior. There are loop-holes in the fence through which they are ſhot. This is conſidered as a ſimple ſyſtem of management, in this branch of farming, by which much profit is capable of being derived from an animal which has hitherto been ſcarcely regarded by the farmer.

DEER-*field*, a park or place where deer are kept.

DEER-*hays*, engines, or great nets, made of cords, to catch deer. Anno 19 Hen. VII. cap. 11.

DEER'S *horns*, in *Natural Hiſtory*, are foſſile remains, bearing a conſiderable reſemblance to the horns of ſtags; ſome of theſe, found imbedded in tuſa, or modern concretions of calcareous matter, as at Matlock-Bath, and at Alport in Derbyſhire, are of immenſe ſize, although pretty cloſely reſembling recent deer's horns in other reſpects. Many extraneous foſſils have been denominated deer's-horns, which are in reality the caſts of branched coraloid ſubſtances. See STAG'S *Horns*.

DEER-*neck*, in *Rural Economy*, a term in the language of the breeder, which denotes a thin ill-formed neck, as applicable to horſes, neat-cattle, ſheep, &c.

DEER-*ſtealers*, in *Law*. There are ſeveral ſtatutes for the puniſhment of deer-ſtealers; as 1 Jac. I. cap. 27. againſt ſellers and buyers of deer, who are to forfeit 40*s.*—13 Car. II. cap. 10.—3 and 4 W. and M. cap. 10—5 Geo. I. cap. 15 and 28.—9 Geo. I. cap. 22. See BLACK *Act*. 10 Geo. II. cap. 32.—28 Geo. II. c. 19. 16 Geo. III. c. 30.

By ſtat. 5 Geo. I. c. 28. wounding or killing deer in a park is puniſhable with tranſportation. By 9 Geo. I. c. 22, to hunt, wound, kill, or ſteal any deer, in the king's foreſts or chaſes incloſed, or in any other incloſed place where deer have been uſually kept; or by gift or promiſe of reward to procure any perſon to join in ſuch unlawful act: all theſe are felonies without benefit of clergy. But the principal ſtatute for the puniſhment of deer-ſtealers, is the 16 Geo. III. c. 30., which enacts, that if any perſon ſhall hunt or take in a ſnare, or kill or wound, any red or fallow deer in any foreſt, chaſe, &c. whether incloſed or not; or in any incloſed park, a paddock, &c. or be aiding in ſuch offence, they ſhall forfeit 20*l.* for the firſt offence, and alſo 30*l.* for each deer wounded, killed, or taken. A game-keeper offending, incurs the penalty of double forfeiture. For a ſecond offence thoſe who are guilty ſhall be tranſported for 7 years. Juſtices may grant warrants to ſearch for heads, ſkins, &c. of ſtolen deer, and for toils, ſnares, &c.; and perſons having ſuch in their poſſeſſion, forfeit from 30*l.* to 10*l.*, at the diſcretion of the juſtices. Perſons unlawfully ſetting nets or ſnares, forfeit for the firſt offence from 10*l.* to 5*l.*; and for every other offence from 20*l.* to 10*l.* Perſons pulling down pales, or fences of any foreſt, chaſe, park, paddock, wood, &c., are ſubject to the penalties annexed to the firſt offence for killing deer. Dogs, guns, and engines may be ſeized by park-keepers; and perſons reſiſting ſhall be tranſported

transported for 7 years. Penalties may be levied by distress, in default of which offenders are to be committed for 12 months. No *certiorari* to be allowed, unless the party convicted become bound to the prosecutor in 100*l.* to pay him all costs and damages, and to the justice in 60*l.* to prosecute the *certiorari* with effect, &c. &c. Prosecutions are limited to 12 months from the time of the offence committed. By stat. 28 Geo. II. c. 19, destroying gorze, furze, and fern in forests and chaces, being the covert for deer, subjects the offenders to a penalty from 5*l.* to 40*s.* or to three months' imprisonment. For further particulars, see GAME and LARCINY.

DEERFIELD, in *Geography*, a post-town of America, in Cumberland county, and state of New Jersey; 178 miles from Washington.—Also, a very pleasant post-town in Hampshire county, and state of Massachusetts, seated on the west bank of Connecticut river, from which the compact part of the town is separated by a chain of high hills. It lies in the midst of a fertile country, and has a small inland trade. The compact part of the town includes from 60 to 100 houses, and a handsome congregational church, and the number of inhabitants is 1531. An academy, incorporated in 1797, under the name of "the Deerfield academy," is established in this town, distant from Washington 430 miles N.E.—Also, a well-settled agricultural town in the county of Rockingham, and state of New Hampshire, formerly a part of the township of Nottingham; 19 miles S. E. of Concord, and 35 N.W. of Portsmouth; containing 1878 inhabitants, and incorporated in 1766.—Also, a river called *Pocomtic*, which rises in Bennington county, Vermont, and unites a number of streams from the adjoining towns on entering Massachusetts; thence winding in an easterly direction, it receives North river, and discharges itself into Connecticut river between the townships of Greenfield and Deerfield. On its banks are tracts of excellent meadow ground.

DEERING, a township of America, in Hillsborough county, and state of New Hampshire, incorporated in 1774; containing 1244 inhabitants, and distant 15 miles S.W. of Concord, and 54 miles W. of Portsmouth.

DE ESSENDO *quietum de tolonio*, in *Law*, a writ that lies for those who are by privilege freed from the payment of toll, on their being molested. Nat. Br. fol. 226.

DE EXPENSIS MILITUM, a writ commanding the sheriff to levy four shillings *per* day, to defray the expences of a knight of the shire attending in parliament. See KNIGHT.

There is a like writ *de expensis civium & burgensium*, to levy two shillings per day for every citizen and burgess in parliament. 23 Henry VI. cap. 14. See BURGESS.

DE FACTO, something actually in fact, or existing; in contradistinction to *de jure*, where a thing is only so in justice, or equity, but not in fact.

After the revolution, the retainers of the abdicated king insisted much on the difference between a king *de jure* and *de facto*, or a prince in actual but not legal possession of the crown, and another who had the right but not the possession. The non-jurors held the pretender for king *de jure*; and only allowed king George for king *de facto*.

DEFAIT, or DECAPITE', a term used by the French *Heralds* to denote a beast whose head is cut off smooth; in which it differs from erased, where the head is, as it were, torn off, and the neck left ragged.

DEFALCATION, from the French *defalquer*, to *diminish*; denotes the deduction or subtraction of a small sum, in matters of account, from a large one.

DEFAMATION, in *Law*, is when a person speaks scandalous words of another, or of a magistrate, &c. whereby they are injured in their reputation; for which the party offending shall be punished, according to the nature and quality of the offence; sometimes by action on the case at common law, sometimes by statute, and sometimes by ecclesiastical law. But defamation is also punishable by the spiritual courts; in which courts it ought to have three incidents; first, it is to concern matters spiritual, and determinable in the ecclesiastical courts; as for calling a man heretic, schismatic, adulterer, fornicator, &c. Secondly, that it be a matter spiritual only; for if the defamation concern any thing determinable at the common law, the ecclesiastical judges shall not have conusance thereof. And thirdly, though such defamation be merely spiritual, yet he that is defamed cannot sue for damages in the ecclesiastical courts, but the suit ought to be only for punishment of the fault by way of penance. Terms de Ley, 224, 225.

DEFAMATORY, a term chiefly used in the phrase defamatory libel, signifying a writing intended to scandalize or discredit a person, &c.

By the Roman law, and the ancient ordonnances of France, the authors of defamatory libels were punished with death. See Balduin. Comment. ad Leges de Libellis famosis.

But the historian tells us, that cardinal Ximenes was insensible to all defamatory libels; he found it but reasonable to leave inferiors the liberty of venting their grief by writings, which only live while the person is offended at them, and lose all their spirit and malignity when despised or disregarded.

DEFAN, CAPE, in *Geography*, the last cape of the shore of Abyssinia, before you run into the straits of Babelmandeb; it is called by the Portuguese *Cape Dafui*. This, says Mr. Bruce, has no meaning in any language; the Abyssinians, on whose side it is, call it *Cape Defan*, or the cape of Burial, probably because the east wind drove ashore those who had been shipwrecked in the voyage. See GARDEFAN.

DEFAULT, in *Law*, non-appearance, before a court of justice, at a day assigned, or an omission of what a person ought to do. (Bract. lib. v. tract. 3. Co. Litt. 259.) If a plaintiff makes default in appearance in a trial at law, he will be non-suited; and where a defendant makes default, judgment shall be had against him by default. See JUDGMENT, and NONSUIT. By default of a defendant, he is said to be generally out of court to all purposes, but only that judgment may be given against him; and no judgment can be afterwards given for the defendant. (1 Nels. Abr. 628.) Suffering judgment to go by default is an admission of the contract declared on. (Stra. 612.) After the inquest is taken by default, the defendant can make no suggestion on the roll. (Str. 46.)

Jurors making default in their appearance for trying of causes shall lose and forfeit issues, unless they have a reasonable excuse proved by witnesses, in which case the justices may discharge the issue for default. Stat. 35 Hen. VIII. c. 6. See JURY.

DEFEASANCE, or DEFEAZANCE, (from the French *defaire*, to *defeat*,) is of two sorts; 1. A collateral deed, made at the same time with a feoffment or other conveyance, containing certain conditions, upon the performance of which the estate then created may be *defeated*, or totally undone. In this manner mortgages were in former times usually made; the mortgager infeoffing the mortgagee, and he at the same time executing a deed of defeazance, whereby the feoffment was rendered void on repayment of the money borrowed at a certain day. And this, when executed at the same time with the original feoffment, was considered as part of it by the ancient law (Co. Litt. 236); and, therefore, only indulged; no subsequent secret accommodation of a solemn conveyance,

veyance, executed by livery or feifin, being allowed in thofe days of fimplicity and truth; though, when ufes were afterwards introduced, a revocation of fuch ufes was permitted by the courts of equity. But things that were merely executory, or to be completed by matter fubfequent, (as rents, of which no feifin could be had till the time of payment; and fo alfo annuities, conditions, warrranties, and the like) were always liable to be recalled by defeazances made fubfequent to the time of their creation. (Co. Litt. 237.) 2. A defeazance, on a bond, or recognizance, or judgment recovered, is a condition, which, when performed, defeats or undoes it, in the fame manner as a defeazance of an eftate before-mentioned. It differs only from the common condition of a bond, in that the one is always inferted in the deed or bond itfelf; the other is made between the fame parties by a feparate, and frequently a fubfequent deed. (Co. Litt. 237. 2 Sand. 47.) This, like the condition of a bond, when performed, difcharges and difencumbers the eftate of the obligee. To make a good defeazance it muft be, 1. By deed; for there cannot be a defeazance of a deed without a deed; and a writing under hand doth not imply it to be a deed. 2. It muft recite the deed it relates to, or at leaft the moft material part thereof. 3. It is to be made between the fame perfons who were parties to the firft deed. 4. It muft be made at the time of, or after, the firft deed, and not before. 5. It ought to be made of a thing defeafible. 1 Inft. 236. 3 Lev. 234.

DEFEAT, in a *Military Acceptation*, relates to the inability of an army to refift the attack of another, and its yielding the field to the fuperior power of its adverfary. Such we may, for the moft part, confider to be the juft definition of this term; and we may, generally fpeaking, view a defeat as being attended with certain loffes and difadvantages. But we have numerous inftances on record, wherein it appears that armies driven from the field, have retired under fuch refpectable circumftances, and with their power fo perfectly compacted, as to render it imprudent, nay impracticable, to purfue, or to follow up the victory. It is, in fact, under the circumftance of inability to maintain his ground, that a general's abilities will become moft confpicuous. If the arrangement has been made merely upon a curfory view of the field, and without due confideration in regard to a poffibility of being compelled to give way, the defeat will probably be general, and fatal. If the plan has been well digefted, and the different commanders have received inftructions regarding their conduct in cafe of difafter, either to their own divifions, or among thofe in other parts of the army, the defeat will, in all probability, be merely a retreat; a ceffation from attack; the abandonment of fome particular poft, no longer tenable; or fome fuch partial difadvantage; and the whole will take a new pofition, according to previous arrangement, fo as to make up for the failure in fome degree, by checking purfuit, and avoiding the neceffity of totally relinquifhing the field. Sham defeats have occafionally been ufed as devices for alluring troops from ftrong holds, or for caufing a part of the enemy's line to pufh forward in purfuit of the fuppofed fugitive corps; fo that the imprudent followers might be fuddenly flanked by parties, concealed for the purpofe, or detached from other parts of the line; and advantage be taken of the break or vacancy, thus occafioned in the enemy's line. Sham defeats are, however, very hazardous; it being difficult to infpire retiring troops with confidence, or to make them rally, and return to the charge, at the precife moment when their doing fo would render them certain of victory. If it were poffible, or prudent, always to caution the body, which fhould appear to be defeated, of the intention, fuccefs would probably be fecured; but amidft the innumerable occurrences of the day, and when fmoke and noife debar the poffibility of general communication, much more of individual inftruction, it becomes impoffible to difpenfe the neceffary precautions. A commander, doubtful of the fuccefs of an attack, fhould defer it to a late hour; fo that he may, if defeated, afford lefs time for the enemy to take advantage of his misfortune.

DEFECTION, the act of abandoning, or relinquifhing, of a party, or an intereft, a perfon had been engaged in. The word is formed of the Latin *deficio*, *to fail of*.

DEFECTIVE, or DEFICIENT *Nouns*, in *Grammar*, are fuch as want either a whole number or a particular cafe, or are totally indeclinable.

The term defective is alfo applied to a verb that has not all its moods and tenfes.

DEFECTIVE *Third*, in *Mufic*. See DIMINISHED *Third*, and DEFICIENT.

DEFECTIVE *Fifth*. When upon the firft inverfion of the mixed cadence, the fixth of the fubmediant (or fourth of the fcale) is accidentally fharpened, the chord of the extreme fharp fixth is formed, the radical bafe of which is the fupertonic of the key, and its fifth is allowed to be flat or defective, that the original minor mode may not be totally deftroyed. See Callcott's Muf. Gram. 219.

DEFECTIVE *Scale*. Dr Smith has applied this name to a fyftem of temperament defcribed by him, wherein the major thirds and fifths beat equally quick, the former fharp, and the latter flat; in which eight fifths in afcending from C, and three fifths defcending from the fame note, are each flattened about $\frac{5}{23}$ parts of a comma, leaving a wolf between ♭A and ♭E, wherein the fifth is fharpened $14\frac{7}{23}s + 1\frac{2}{23}m$. See TEMPERAMENT.

The term defective fcales is fometimes applied generally to all the douzeanes, or fyftem wherein only 12 notes are ufed within the octave.

DEFECTUM, *Challenge Propter*. See CHALLENGE.

DEFENCE, in a *Military Acceptation*, means the refiftance made by an inferior force, or by troops that have taken poft within a fortified place, or that have thrown up temporary works to protect them from affault. The immenfe variety of circumftances attendant on the defences of various pofts would lead us into volumes of digreffion on hiftorical fubjects; we fhall, however, ftate, that in the event of provifions, and warlike ftores in general being at hand, there are few fituations which do not admit of confiderable protraction in regard to the term, or period, of refiftance. Without looking back to ancient data, when the famous fiege of Troy attracted the attention of all the then civilized ftates, we may refer our readers to modern events fufficiently eminent, and exemplary, to claim the notice of thofe who may be interefted in this branch of honourable emulation. Perhaps we may be correct in ftating the defence of Turin, when befieged by the French, and defended by marfhal count Daun, to be one of the moft brilliant exploits recorded in the annals of military hiftory. With a very few battalions, but firmly fupported by the public fpirit and private efteem of the inhabitants, he held out for near feven months, againft a force of full feventy thoufand men, although the defences of the town were in many parts completely demolifhed, and the greater part of the interior deftroyed by the enemies' mortar batteries. Under fuch circumftances, with a perfon lefs endued with courage and refolution, and a mind lefs capable of finding refources in fituations promifing no fupply or means of repulfion, Turin would infallibly have furrendered; but the count's ingenuity was equal to the difficulty

culty of his ſituation, and enabled him to deviſe means for upholding the honour of his ſovereign's arms, in ſpite of the formidable attack which inceſſantly poured deſtruction around the brave handful of defenders. The count had, in the firſt inſtance, cauſed an exact inventory to be taken of all the ſtores, proviſions, merchandiſe, &c. in the town, when the enemy firſt ſat down before it. His active mind was buſied in contriving the means of appropriating every thing within the walls to their defence. Among other articles of merchandiſe were ſome thouſand bales of cotton, and a large quantity of oils. When the breach became practicable, and the enemy came to the aſſault, a quantity of the cotton, previouſly ſteeped in oil, was ſet fire to, and thrown in ſmall parcels among the ſtorming party, whoſe ammunition took fire in their pouches, and exploded, while their perſons were miſerably ſcorched by the unprecedented miſſiles; this being often repeated, the aſſailants were abſolutely diſheartened, and diſcontinued their aſſaults; converting the ſiege into a blockade. From this ſtate the brave defenders were relieved by the approach of prince Eugene, who raiſed the ſiege.

It is worthy of remark, that, by this determined defence, an army of ſeventy thouſand men was, in fact, loſt to its ſovereign for a whole campaign; while a very heavy expence, and loſs in various reſpects, neceſſarily reſulted. Hence we ſee the importance of a garriſon holding out to the laſt, and cauſing a diverſion in favour of troops acting in another quarter. With what feeling muſt the ſenſible mind contemplate the conſequences of an oppoſite conduct on the part of our allies within the laſt two years; when fortreſſes, hitherto judged impregnable, ſurrendered in many inſtances without even the ſhew of reſiſtance.

Need we uphold for an example the wonderful manner in which the brave Elliot defeated the efforts of the combined armies and navies of France and Spain, to force the ſurrender of Gibraltar! Hiſtory may record, but cannot do juſtice to, the defence made by our countrymen, not exceeding 5400 in the total, againſt upwards of 100,000 choſen men, ſupported by a numerous fleet, and in poſſeſſion of a thouſand comforts and neceſſaries, of which the garriſon were wholly deprived! We will not in this place anticipate the proceedings on that occaſion, which will be found under the head GIBRALTAR, but ſtate a recent inſtance of energy and contrivance on the part of one of Holkar's generals; a man ſuppoſed to be little acquainted with the ſcience of defence; and whoſe practice among the native powers of India, could ſcarcely claim the deſignation of experience.

When Bhurtpoor was inveſted by the army under the late lieutenant-general lord Lake, a breach had been made, which was judged practicable; *i. e.* large enough to admit the ſtorming party. The Indian general had, however, availed himſelf of the preſence of a large ſtore of raw hides, which he placed in the breach, their ends pointing inwards and outwards, in ſo artful a manner, that our grape ſhot were buried among them, and cauſed one of our parties, that proceeded to the ſtorm, to paſs the breach, miſtaking it (in the night time) for an unbattered part of the wall. It is remarkable that Bhurtpoor never ſurrendered; and, that, although a treaty was concluded under its walls, the implied ſubmiſſion of its garriſon was not underſtood.

But, as above remarked, it would not be prudent for us to enter on ſo wide a field of exemplification as the ſubject may admit; we ſhall therefore conclude with obſerving, that genius, bravery, foreſight, and fortitude, will often oppoſe ſuch formidable barriers, even where the means, ſuperficially conſidered, appear very inadequate, or indeed inſignificant, as may at leaſt retard, if not totally fruſtrate, the operations of great and well ſupplied armies. The veteran cannot but acknowledge this truth as reſulting from his own obſervation, while the tyro in the military art may, in the annals of his profeſſion, find multitudes of inſtances yielding him a rich harveſt of information, and warming his ſoul with admirable emulation.

DEFENCE, *Line of*, is that which flanks a baſtion, being drawn from the flank oppoſite to it.

The line of defence ſhould not exceed a muſket-ſhot.

The *greater*, or *fichant*, line of defence, is a right line, drawn from the point, or vertex, of the baſtion, to the concourſe of the oppoſite flank with the curtin.

The *leſſer* line of defence, called alſo *raſant*, and *flanquant*, is the face of the baſtion continued to the curtin.

DEFENCE, in *Old Law-Books*, is ſometimes uſed for prohibition.

Thus in Rot. Parl. 21 Edw. III. cries and defence were made throughout England, *i. e.* proclamation and prohibition. *Salmones ponantur in* defenſo. Stat. Weſt. 2. cap. 47. Salmons are by that act prohibited to be taken at certain times. *Uſurarios* defendit *rex Eduardus, ne remanerent in regno*. LL. Edu. Confeſſ. cap. 37. In the ſtatutes of Edward I. we have one, entitled, *Statutum de* defenſione *portandi arma*, &c. and it is defended by law, to diſtrain on the high-way.

This ſenſe of the word was probably borrowed from the French, in which language it is ſo applied.

DEFENCE, in its true legal ſenſe, denotes an oppoſing or denial of the truth or validity of the complaint, anſwering to the *conteſtatio litis* of the civilians. It is a general aſſertion which the defendant makes immediately after the count or declaration, that the plaintiff hath no ground of action; which aſſertion is afterwards extended and maintained in his plea.

The courts were formerly very nice and curious with reſpect to the nature of the defence, ſo that if no defence was made, though a ſufficient plea was pleaded, the plaintiff ſhould recover judgment (Co. Litt. 127); and therefore the book entitled "Novæ Narrationes," or the "New Talys," (ed. 1534.) at the end of almoſt every count, *narratio*, or tale, ſubjoins ſuch defence as is proper for the defendant to make. For a general defence or denial was not prudent in every ſituation, ſince thereby the propriety of the writ, the competency of the plaintiff, and the cognizance of the court were allowed. By defending the force and injury the defendant waved all pleas of miſnomer; by defending the damages, all exceptions to the perſon of the plaintiff: and by defending either one or the other *when and where* it ſhould behove him, he acknowledged the juriſdiction of the court. (Co. Litt. 127.) But of late years theſe niceties have been very deſervedly diſcountenanced (Salk. 217. Ld. Raym. 282.); though they ſtill ſeem to be law, if inſiſted on. (Carth. 230.) A defendant cannot plead any plea before he hath made a defence; though this muſt not be intended abſolutely, for in a *ſcire facias*, a defence is never made. (3 Lev. 182.)

DEFENCE-*month* is more uſually called Fence-month. See FENCE-*month*.

DEFENCES, in *Heraldry*, are the weapons of any beaſt; as, the horns of a ſtag, the tuſks of a wild boar, &c.

DEFENCES *of a fortified Place*, include the various works intended either to cover the garriſon, or to annoy an enemy. This term comprehends a great variety of buildings, excavations, &c. for the explanation of which we muſt generally refer our readers to the heads of *Military* CONSTRUCTION and FORTIFICATION; wherein all the parts, with their ſeveral intentions,

intentions, appropriations, and proportions, will be fully exhibited. In this place we ſhall ſtate, that the defences of regular fortifications are claſſed under two diſtinct heads; *viz.* the body of the place, as delineated by an out-line called the *principal*; and the exterior defences called the *out-works*.

It is a rule held ſacred, in the theory of the art, that the defences ſhould ever be exactly proportioned to the object in view, and to the number of men that can be allotted as a garriſon. We are to take into conſideration the number of yards the defences preſent as a front, the quantity of ordnance they mount, the means of ſafely lodging the troops, and ſheltering the proviſions and ſtores requiſite for a long ſiege; the ſupply of water is alſo a primary object towards the ſecurity of which the defences muſt to a certain degree conform.

Thus we ſhould underſtand, that the defences ought never to exceed that extent which could be well manned by ſuch a garriſon as could be lodged and proviſioned; and that the garriſon ought not to exceed the reaſonable value of the occupancy. For want of due attention to theſe truly important points, it has, more than once, happened that the beſt conſtructed works have proved inefficient. The diſtribution of the various defences, ſo as to form a mutual ſupport, without ſubjecting the principal, or body of the place, to annoyance from ſuch parts as might be cut off, and poſſeſſed by the enemy, is called the *defilement*, (which ſee,) and is an indiſpenſible conſideration while planning the out-works. Whatever may be their extent, it is neceſſary, that, though temporary, ſafe lodgment ſhould be furniſhed in all out-works for the defenders, and their ſupplies; while the more retired, and concentrating parts of the fortreſs, ſhould become gradually more ſubſtantial, more elevated, and more conveniently arranged for the reception of ſuch of the defenders as may be driven in from the out-works: it being obvious, that were this precaution neglected, each diviſion of troops muſt ſurrender with the part allotted to its defence, or retire within the principal, where its preſence would create confuſion, diſeaſe, and ſcarcity.

DEFEND, Defendere, in our *Ancient Laws* and *Statutes*, ſignifies to prohibit or forbid. See Defence. 5 Rich. II. cap. 7. In which ſenſe alſo Chaucer uſes it, in the following paſſage:

> " Where can you ſay, in any manner, age,
> That ever God *defended* marriage."

See alſo Milton's Parad. Loſt, book ii. line 86.

DEFENDANT, a term in *Law*, ſignifying him who is ſued in an action perſonal; a tenant is he who is ſued in an action real.

DEFENDEMUS, a term uſed in grants and donations, having this force, that it binds the donor and his heirs to defend the donee, if any man go about to lay any incumbrance on the thing given, other than is contained in the deed of donation. Bract. lib. ii. c. 16. See Warranty.

DEFENDER of the Faith, *(Fidei Defenſor,)* is a peculiar title belonging to the king of England; as *Catholic* to the king of Spain; and *Moſt Chriſtian* formerly to the king of France, &c. Theſe titles were given by the popes of Rome; and that of *fidei defenſor* was firſt conferred by Leo X. on king Henry VIII. for writing againſt Martin Luther; and the bull for it bears date quinto idus Octob. 1521. It was afterwards confirmed by Clement VII. (Lord Herbert's Hiſt. of Henry VIII. 105.) But the pope, on Henry's ſuppreſſing the houſes of religion at the time of the Reformation, not only deprived him of his title, but depoſed him from his crown alſo: though, in the thirty-fifth year of his reign, this title, &c. was confirmed by parliament; and hath continued to be uſed by all ſucceeding kings to this day. (Lex Conſtitutionis, 47, 48.) Chamberlayne ſays, the title belonged to the kings of England before that time; and for proof hereof appeals to ſeveral charters granted to the univerſity of Oxford! So that pope Leo's bull was only a renovation of an ancient right. Pref. ſtat. lib. i. cap. 2.

DEFENDERE Unica manu, to wage law, by denying the accuſation upon oath. " Et ſi forte foriſfactor ille factum negaverit & foreſtarius ſolus ſit ſine teſte, ille debet ſe defendere unica manu ad unicam vocem rationabili die data in curia abbatis, & ſi unicum teſtem vel plures habuerit, debet ſe defendere ſexta manu, &c." Charta facta inter W. de Bray, mil & Abb. & Convent, de Oſeney, ſine dat. See Manus.

DEFENDERS were anciently notable dignitaries, both in church and ſtate; whoſe buſineſs was to look to the preſervation of the public weal, and to protect the poor and helpleſs, and to maintain the intereſts and cauſes of churches and religious houſes.

The council of Chalcedon, can. 2. calls the defender of a church, ἔκδικος. Codin. De Officiis Aulæ Conſt. makes mention of defenders of the palace; ſo does Bollandus, Act. S. Januar. tom. i. p. 501. There were alſo a defender of the kingdom, *defenſor regni;* defenders of cities, *defenſores civitatum;* defenders of the people, *defenſores plebis;* of the poor, fatherleſs, widows, &c.

About the year 420, each patriarchal church began to have its defender; which cuſtom was afterwards introduced into other churches, and continued to later days under other names; as thoſe of advocate and advouee. See Advocate, and Advouee.

In the year 407, we find the council of Carthage aſking the emperor for defenders, of the number of ſcholaſtici, *i. e.* advocates who were in office; and that it might be allowed them to enter, and to ſearch the cabinets and papers of the judges, and other civil magiſtrates, whenever it ſhould be found neceſſary for the intereſt of the church.

DEFENDING, in *Fortification*, is ordinarily ſynonymous with flanking. Thus we ſay the flank defends the curtin, and the oppoſite face of the baſtion; this demilune flanks, or defends the horn, or crown-work.

When they ſay the flank defends the curtin, they mean not only that it is aſide of the curtin, but, alſo, that it prevents the approaches: that is, ſuch as are poſted on the flank of a baſtion, can ſee any that come to attack the curtin; and can ſhoot them, or prevent their approaching it.

Defending-*Angle, Inner*, is the angle made by the leſſer line of defence with the curtin.

Defending-*Angle, Outer*, is the angle formed by the two leſſer lines of defence.

The lines, or ſides, of the rampart or wall, defended by muſkets or carbines, are more eaſy, cheap, and commodious, than cannons.

DEFENSITIVE, in *Surgical Pharmacy*, is a term applied to ointments, plaſters, and other applications, the uſe of which is merely to defend the ſurface, to which they are applied, from receiving injury by any accident, or from being irritated by cauſtic or by acrid diſcharges and the like.

DEFENSIVE Allegation, in *Law*. See Allegation.

DEFENSO, that part of any open field or place, that was allotted for corn and hay, and upon which there was no common or feeding, was anciently ſaid to be *in defenſo*: ſo of any meadow ground that was laid in for hay only. It was

was likewife the fame of a wood, where part was enclofed and fenced up to fecure the growth of the underwood from the injury of cattle.

DEFENSOR. See ADVOCATE.

DEFERENS VAS, in *Anatomy*, the tube which conveys the femen from the epididymis to the urethra. It afcends along the back of the fpermatic chord, enters the abdomen at the abdominal ring, takes its courfe fubfequently over the fide and under part of the bladder, and then penetrates the proftate gland and urethra. For a further account of it, fee GENERATION, *Organs of*.

DEFERENT, or DEFERENS, in the *Ancient Aftronomy*, a circle invented to account for the eccentricity, perigee, and apogee of the planets.

As the planets are found differently diftant from the earth, at different times, it was fuppofed, that their proper motion was performed in a circle, or ellipfis, which is not concentric with the earth; and this eccentric circle, or ellipfis, they call the deferent; becaufe, paffing through the centre of the planet, it feemed to fupport or fuftain it in its orbit.

The deferents are fuppofed differently inclined to the ecliptic, but none more than eight degrees, excepting that of the fun, which is in the plane of the ecliptic itfelf, and is cut differently by the deferents of the other planets in two places called nodes.

In the Ptolemaic fyftem, the fame deferent is alfo called the deferent of the epicycle; becaufe it traverfes the centre of the epicycle, and feems to fuftain it.

DEFERTINES, in *Geography*, a fmall town of France, in the department of the Allier, three miles N. E. of Montluçon.

DEFESCH, in *Biography*, a German mufical compofer and performer on the violin, who came to England about 1739, and frequently led the band at Marybone. He was a good contrapuntift, and a voluminous writer, but his productions were in general dry and uninterefting.

Mrs. Clive, after a quarrel and battle with Dr. Arne, behind the fcenes of Drury-lane theatre, would perform none of the doctor's mufic; and when he had new fet the Tempeft, and prepared for her his charming air in the part of Ariel, "Where the bee fucks," fhe refufed to fing it, and employed Defefch to fet the fame words, and whatever elfe fhe had to perform in all her parts, which was a greater lofs to the public, than difgrace to Dr. Arne, who was as fuperior to Defefch in genius, as Mingotti was to Clive in the art of finging. Yet fo little do we know our own powers, that though fhe was a moft admirable and original actrefs in fuch comic parts as Nell in "The Devil to Pay," and Mrs. Heidelberg, in the "Clandeftine Marriage," fhe never was fo happy as when fhe played lady Townley, and was attempting to fing fine ferious Italian fongs: though fhe had neither ear, voice, nor knowledge of mufic, fo that had Defefch's fongs been lefs dull than they ufually were, they would never have been fung into public favour by Mrs. Clive.

DEFIANCE. See CHALLENGE.

DEFIANCE, in *Geography*, a fort in the ftate of Ohio, fituated on the point of land formed by the confluence of the rivers of Au Glaize, and the Miami of the lake, nearly in the midway between fort Wayne on the Miami, and lake Erie. N. lat. 41° 41′. W. long. 84° 43′.

DEFICIENT INTERVAL, in *Mufic*, is ufed for an interval lefs than the true by a comma. See INTERVAL.

DEFICIENT *Numbers*, are fuch whofe parts added together make lefs than the integer, whofe parts they are. See NUMBER.

Such *e. gr.* is 8; whofe quota parts are 1, 2, and 4; which, together, only make 7. See ABUNDANT *Number*.

DEFICIENT *Hyperbola* is a curve of that denomination, having only one afymptote, and two hyperbolic legs running out infinitely towards the fide of the afymptote, but contrary ways. (See CURVE.) This name was given to the curve by Newton in his "Enumeratio Linearum tertii ordinis." Of thefe there are 6 different fpecies, which have no diameters, expreffed by the equation $xyy + ey = -ax^3 + bx^2 + cx + d$, the term ax^3 being negative. When the equation $ax^4 = bx^3 + cx^2 + dx + \frac{1}{4}ee$ has all its roots real and unequal, the curve has an oval joined to it. When the two middle roots are equal, the oval joins to the legs, which then cut one another in the fhape of a noofe. When three roots are equal, the nodus is changed into a very acute cufp or point. When, of three roots with the fame fign, the two greateft are equal, the oval vanifhes into a point. When any two roots are imaginary, there is only a pure ferpentine hyperbola, without any oval, decuffation, cufp, or conjugate point; and when the terms b and d are wanting, it is of the 6th fpecies. There are alfo 7 different fpecies of thefe curves, having each one diameter, expreffed by the above equation, when the term ey is wanting, according to the various conditions of the roots of the equation $ax^3 = bx^2 + cx + d$, as to their reality, equality, their having the fame figns, or two of them being imaginary.

DEFILE, in the *Military Acceptation*, is a narrow way or path, admitting only of a few perfons (fometimes indeed only one) proceeding a-breaft; and ufually ferving as the road through wilderneffes, mountainous countries, &c. The term is derived from the thread given by Ariadne to Thefeus when he entered the celebrated labyrinth of Dædalus, king of Crete, for the purpofe of, according to the modern term, "unthreading" the paffage by which he had entered. Hence, when an army proceeds through clofe countries, wherein they cannot perform evolutions, and are compelled to march by files, *i. e.* with a very narrow front, not exceeding three or four abreaft, it is faid to "file off," or to "defile." Defiles are very often confounded with paffes, though there is a very obvious diftinction; for a defile may be of any extent, even to the length of thirty or forty miles, whereas a pafs more properly fpeaking relates to fome particular fpot; like the Thermopylæ, where three hundred Greeks fufficed to arreft the progrefs of the hoft, hiftory fays near a million, with which Xerxes threatened to over-run their country. We may form a more correct idea of the nature of defiles, if we recollect, that in the early part of the French revolution, when general Moreau was hemmed in by the Auftrians on the borders of the Black Foreft, he retreated through that immenfe wildernefs towards Conftance, cutting roads and opening paffages by manual labour for his cannon and baggage waggons; thus his army *defiled* through the Black Foreft, to the admiration of all Europe. From this explanation it will be feen that *paffes* are defences, chiefly natural, which offer more or lefs difficulty at particular localities, while fuch mazes as render the paffage of troops confined and difficult, by their ruggednefs, clofe arborage, and meandering courfe amidft a variety of impediments, are to be confidered as *defiles*.

DEFILEMENT, in *Fortification*, fignifies the branching forth of various outworks in their proper directions, fo that the one may ferve to fupport the other, while, at the fame time, all the defences depending exteriorly on any face or front, of the principal, or body of the place, may be under the command and fire of the more centrical batteries, &c., in order that the more detached parts, when carried by the enemy, may not afford a fafe lodgment, but be open to the enfilade, or to the direct fire, of the principal.

Our readers muft be fenfible, that in proportion as con-

centric circles become more remote from their common centre, they neceffarily acquire a greater perimeter, or circumference; confequently, the outworks cover a far greater meafurement of area, than the body of the place. This extenfion admits of, and demands a greater variety of flanks, &c, than could be defcribed, on a proper fcale, within a more circumfcribed fpace. But, in the formation of fuch exterior defences, it requires no fmall art (we fpeak of level ground) to arrange the whole in fuch manner as may form a perfect fyftem of mutual defence, without giving the enemy a fhelter, or eventually even a battery, from which he may be enabled to annoy the garrifon. Want of care in this particular has been fatal to many fortified places.

Fortreffes fituated on ground interfected by heights, or commanded by elevated batteries, are lefs in danger from the want of that defilement which is indifpenfable in ordinary inftances; but there muft, in every cafe, be due regard paid to the mutual fupport of out-works, and particular care muft be taken to conftruct batteries in thofe parts which may be leaft acceffible, and have the greateft range; in fuch parts the defences ought to be adapted, not only to the general defence, but to the expulfion of the enemy from fuch works as they may chance to carry. This, in fact, is a fpecies of defilement, though not on that fyftematic plan which is prevalent in all the modern fyftems of regular fortification.

To DEFILE, to go off file by file. See FILE.

The army began to defile on the left, and was forced to defile at each end of the field, on account of the moraffes and the woods.

DEFINITE, in *Grammar*, is applied to an article that has a precife determinate fignification.

Such are the articles *the* in Englifh, *le* and *la* in French, &c. which fix and afcertain the noun they belong to, to fome particular; as *the* king, *le* roy; whereas, in the quality *of* king, *de* roy, the articles *of* and *de*, mark nothing precife; and are therefore called indefinite. See ARTICLE.

DEFINITION, in *Logic*, an enumeration of the chief fimple ideas whereof a compound idea confifts; in order to afcertain or explain its nature and character.

The fchoolmen give very imperfect notions of definition. Some define it the firft notion, or conception, that arifes of a thing, whereby it is diftinguifhed from every other, and from which all the other things, that we conceive of it, are deduced; but the ufual definition of it is, *oratio explicans quid res eft*, a difcourfe explaining what a thing is: that is, as fome farther explain it, a difcourfe fetting forth thofe attributes which circumfcribe and determine the nature of a thing. For, to explain is only to propofe the parts feparately and exprefsly, which were before propofed conjunctly and implicitly; fo that every explication has regard to fome whole. Hence, according to the diverfe kinds of parts in any thing, *viz.* phyfical parts, metaphyfical parts, &c. arife fo many different kinds of definitions of the fame thing; thus, man is either defined an animal, confifting of foul and body; or, a reafonable animal, &c.

Definitions are of two kinds; the one *nominal*, or, *of the name*: the other *real*, or, *of the thing*.

DEFINITION *of the name*, or *nominal* DEFINITION, is that which explains the fenfe or fignification appropriated to a word: or, as Wolfius more accurately confiders it, it is an enumeration of certain marks, or characters fufficient to diftinguifh the thing defined from any other thing; fo as to leave it out of doubt, what the fubject is that is intended, or denoted by the name. This is what is meant by definition in mathematics.

Such is the definition of a fquare, when it is faid to be a quadrilateral, equilateral, rectangular figure.

By definition of the name, is either meant a declaration of the ideas and characters appropriated to the word in the common ufage of the language; or the peculiar ideas, &c. which the fpeaker thinks fit to denote by that word, *i. e.* the fpecial fenfe wherein he propofes to ufe it, in his future difcourfe. For it may be obferved that the fignificancy of any word depends entirely on our will; and we may affix what idea we pleafe to a found, which itfelf fignifies nothing at all.

The definition of the name, therefore, in the fecond fenfe, is merely arbitrary, and ought never to be called in queftion; only it is to be minded, that we keep inviolably to the fame fignification. Hence, a definition comes to ftand, or to be made ufe of as an undoubted, or felf-evident maxim; as it frequently does, and particularly among geometricians, who, above all other people, make ufe of fuch definitions.

Not that we mean, that after having defined a thing fo and fo, there is nothing in our idea affixed to the defined term, but muft be granted to the thing itfelf; thus, if any one fhould define heat to be a quality in certain bodies, like that which we feel upon the application of fire, or hot bodies; no man could find fault with the definition, as far as it expreffes what he means by the word heat; but this does not hinder us from denying that there is any thing in the body that warms us, like what we feel in ourfelves.

DEFINITION *of the thing*, or *real* DEFINITION, is properly an enumeration of the principal attributes of a thing, in order to convey or explain its nature.

Thus, a circle is defined a figure, whofe circumference is every where equidiftant from its centre.

Wolfius defines a real definition to be a diftinct notion, explaining the genefis of a thing, that is, the manner wherein the thing is made or done; fuch is that of a circle, whereby it is faid to be formed by the motion of a right line round a fixed point. On which footing, what was before inftanced as a real definition of a circle, amounts to no more than a nominal one.

This notion of a real definition is very ftrict and juft; and affords a fufficient diftinction between a real and a nominal one. But though it has the advantages of analogy, diftinctnefs, and conveniency on its fide; yet, being only itfelf a nominal definition, *i. e.* a definition of the term real definition, we muft confider it in that light, that is, an idea fixed arbitrarily to that word, and which the author always denotes by that word in the courfe of his book. But, in effect, it is not the ufual fenfe, or acceptation of the term; which is much lefs convenient and diftinct. And it is to that ufual acceptation we are here chiefly to have regard.

Definitions are alfo divided into *accurate* and *inaccurate*; the firft make what we ftrictly call a definition; the fecond, we diftinguifh under the name of *defcription*.

Of the parts enumerated in a definition, fome are common to other things befide the thing defined; others are peculiar thereto: the firft are called the *genus* or *kind*; and the fecond the *difference*. Thus, in the former definition of a circle, by a figure, whofe circumference is every where equidiftant from its centre; the word *figure* is the *kind*, as being a name common to all other figures, as well as the circle; the reft are the difference which fpecify, or diftinguifh this figure from every other figure. And hence arifes that rule of F. de Colonia, for the making of a definition. "Take," fays he, "fomething that is common to the thing *defined* with other things, and add to it fomething that is proper, or peculiar to the thing; *i. e.* join the genus and fpecific difference, and you will have a definition." Thus, *e. gr.* rhetoric is defined the art of fpeaking well; for that it is an art, is common to it with feveral other things; but that it is the art of fpeaking well, is peculiar to it alone.

There

There are five common rules of a good definition. 1. That it be clear, and more easy and obvious than the thing defined. 2. That it be universal, or adequate to the thing defined; that is, it must agree to all the species or individuals included under the same idea 3. That it be proper or peculiar to the thing defined. The two ordinary defects of definitions are, not to agree either to the whole thing, or the sole thing defined: neque omni, neque soli: than which nothing is more common, even among the best and justest authors. 4. That it be short. And 5. That neither the thing defined, nor a mere synonymous name, make any part of the definition.

Lord Bacon observes of Aristotle's definitions in the general, that they are very much like that, whereby man should be defined an animal that tills the ground. Nor was his master Plato less exceptionable. The joke put upon him on that account is famous: Plato, it seems, had defined man, *animal bipes & implume*, a two-footed animal without feathers. Upon which, Diogenes the cynic, a great derider of the academics, threw a cock stripped of his feathers, and quite naked, into the middle of Plato's school; crying, "Here is Plato's man."

Our definition of substances, it must be added, are very defective: and as for individuals, we have no definitions at all. The ideas of substances are compounded of the various simple ideas, jointly impressed when they present themselves; and all we can do to define them, is only to enumerate those several sensible ideas, as colour, density, malleability, weight, &c. Thus gold is defined by such a peculiar colour, gravity, &c. Yet such definitions may raise an idea clear enough of that substance in the mind of one who has separately received, by his senses, all the simple ideas that are in the composition of the complex idea defined; though the intimate nature and essence of substance are unknown, and consequently cannot be defined.

It follows, that they are only the modes, or attributes, that can be explained by what we properly call a definition.

Definition, in *Rhetoric*, is one of the common places, and is defined by Tully, a short comprehensive explanation of a thing.

The definitions of the orator, it must be observed, differ much from those of the logician and philosopher: these latter define a thing closely and drily by genus and difference, *e. g.* man is a reasonable animal, &c.

The orators take a larger compass, and define things more ornamentally from the places of rhetoric, thus: man is a curious work of an Almighty Creator, framed after his own image, and endued with reason, and born for immortality. But this rhetorical definition, in strictness, comes nearer to the nature of a description than an accurate definition.

DEFINITIVE is applied to somewhat that terminates or decides a question, or process. Thus we say:

The house of lords have passed a definitive sentence in such a cause: the church has given a definitive judgment on such an article of faith.

The word stands in opposition to provisional, and interlocutory.

Definitive *Pronoun*, in *Grammar*. See Demonstrative.

Definitives, denote, according to the arrangement of Mr. Harris, one of the four species of words; or such as are significant by relation, called by others articles. See Article.

DEFINITOR, a term used in several religious orders, for an assessor, or counsellor of a general, or superior in certain monasteries.

In most orders of religious, the definitor takes place after the superior of the convent he lives in, when in the convent itself; but out of the convent, the definitor's place is before his own superior.

Definitors are also subject in the convent where they reside, to the immediate superior of the convent, as to things relating to the monastic discipline, but in nothing else.

DEFLAGRATION, in *Chemistry*, is usually applied to any rapid combustion spreading through any mixture accompanied with much evolution of flame and vapour. Thus nitre deflagrates when thrown on hot coals, or mixed with charcoal and fired. When accompanied with a loud noise it is termed *detonation*.

DEFLECTION, the turning any thing aside from its former course, by some adventitious or external cause.

The word is often applied to the tendency of a ship from her true course, by reason of currents, &c. which divert her, and turn her out of her right way.

Deflection *of light*. See Inflection *of light*.

DEFLECTIVE Forces, (from *deflecto*, Latin, to bend, to turn aside,) are those forces which act upon a moving body in a direction different from that of its actual course, in consequence of which the moving body is deflected from its original course, *viz.* is obliged to deviate from that direction in which it would move if not acted upon by any of those forces. Thus a ball projecting horizontally from a cannon, would move in a straight line if the force of gravity did not deflect it from that direction. See Central, or Centripetal, and Centrifugal *forces*.

DEFLORATION, or Deflowering, the act of violating or taking away a woman's virginity.

Death, or marriage, are decreed by the civil law in case of defloration. Many anatomists make the hymen a real proof of virginity, persuaded that where it is not found, the girl must have been deflowered. See Hymen.

The ancients had so much respect for virgins, that they would not put them to death, till they had first procured them to be deflowered. On the contrary the natives of the coast of Malabar hold virginity in so little estimation, that they pay strangers to come and deflower their brides. Among the Scots, it was a privilege of the lords of the manor, that they should have the first night's lodging with their tenant's wives. King Malcolm III. allowed the tenants to redeem this service at a certain rate, called marcheta, consisting of a certain number of cows. Buchanan says, it was redeemed with half a mark of silver. The same custom had place also in Wales, Flanders, Friesland, and some parts of Germany. See Borough-English.

By the custom of Anjou and Maine, a maid, after twenty-five years of age, may suffer herself to be deflowered, without being disinherited for it by her father.

Du-Cange quotes an arret of the nineteenth of March, 1409, obtained by the inhabitants of Abbeville, against the bishop of Amiens, for taking money to dispense with an injunction he had made, not to suffer them to consummate their marriage the three first nights; the injunction being founded on a canon of the fourth council of Carthage, which decrees the same, out of reverence of the matrimonial benediction.

DEFLUVIUM, is used to express a distemper in trees, whereby they lose their bark; it is thought to be caused by a sharp humour, that dissolves the glue whereby the bark is fastened to the wood, and sometimes by too much drought.

DEFLUXION, in *Medicine*, from *defluo*, *I flow down*, a term used by the older writers to denote an increased discharge of fluids from any particular part, as from the nostrils, in *coryza*, and from the trachea and bronchial passages in

in *catarrh*, with which the word is fynonymous. It was originally ufed, it would feem, to exprefs the collection of humours in the part, which were fuppofed to *flow down* to it from fome other part. Thus Celfus confiders the diforders, juft named, as occafioned by a *defluxion* of humours from the head to the nofe, throat, and lungs refpectively, lib. iv. cap. 4. de Medicina. Almoft every inflamed part was confidered as the feat of a defluxion of this kind; the morbid fecretions, which were the confequence and production of the inflammatory action of the veffels of the part, being fuppofed to be the caufe of the diforder. See CONCOCTION and CATARRH. Hence the truth of fome of the ancient prognoftic aphorifms; as when it is affirmed, that defluxions on the lungs are dangerous, thefe defluxions including peripneumony and pulmonary confumption; and that defluxions on the eyes, that is, ophthalmia in its various forms, occafion weaknefs of fight and often blindnefs.

DE-FOE, DANIEL, in *Biography*, the fon of James Foe, a butcher by trade, was born about the year 1663, and it is by no means fairly afcertained why Daniel affumed the prefix De to his family name. He was educated at Newington Green, and exhibited an early tafte for literature. As an author, he publifhed, before he had attained the age of manhood, a political pamphlet; and difplayed his regard to the caufe of liberty and the Proteftant religion by joining the infurrection of the duke of Monmouth, but by a happy addrefs he efcaped to the metropolis unnoticed. In the way of trade, he was unfuccefsful, and became infolvent, but to his honour, it muft be recorded, that after he had been legally freed from his debts, by a compofition, he paid moft of them upon a fortunate change of circumftances. He had the ambition of being an inventor, and publifhed an octavo volume, entitled, "An Effay on Projects." In the year 1701, he publifhed "The true-born Englifhman," a fatire which excited a confiderable fhare of attention. The object of this work was to reply to thofe who were perpetually abufing king William and his friends as foreigners, by fhewing that the then-exifting race of Englifhmen was fo mixed and heterogeneous, as to be able to lay claim to no native purity of blood. One of his next pieces was a fatire, entitled "Reformation of Manners," which contains, among other things, an invective againft the flave trade. He is fuppofed to have been the writer of "A Memorial to the Houfe of Commons," ufually denominated the "Legion Letter," which is a manly and fpirited cenfure of the conduct of that affembly in reference to the Kentifh petition. In the year 1702, when the high church party was inclined to perfecute the diffenters, De-Foe publifhed "The fhorteft Way with the Diffenters, or Propofals for the Eftablifhment of the Church." For this he was tried and convicted, and was fentenced to fine, imprifonment, and the pillory. No part of the judgment was mitigated, and fo far from being afhamed of his fate, he wrote "A Hymn to the Pillory." During his imprifonment he publifhed a periodical work, entitled "The Review," which contained the news of the day, and is faid to have given the hint of the Tatler, and the other celebrated papers of Steele and Addifon. He did not finifh the period of his imprifonment in Newgate, but was liberated at the interceffion of Harley, afterwards earl of Oxford, and the queen herfelf afforded affiftance to him and his family. Soon after his liberation he publifhed, by fubfcription, his "Jure divino" in 12 books, the object of which was to expofe the doctrine of the divine right of kings, and to decry tyranny. By the government he was employed in aiding the union with Scotland, and after the important meafure was completed, he drew up and publifhed a hiftory of it in folio. De-Foe thought his great fort was irony, and in many inftances it muft be acknowledged that he was fuccefsful; but on the acceffion of the houfe of Hanover, he made ufe of the fame weapon fo very awkwardly that his publications were taken for libels in favour of the pretender, and he was tried and imprifoned on their account. About the year 1715, he commenced a new ftyle of writing, and publifhed "The Family Inftructor," which has been highly regarded for its excellent moral tendency. But the moft diftinguifhed of the works of Daniel De-Foe is, "The Life and Adventures of Robinfon Crufoe," which was firft publifhed in 1719. This work is too well known to every Englifh reader to ftand in need of being characterifed here. It has paffed through as many editions as almoft any book in our language of the fame ftanding, and muft long continue to be the favourite book in the juvenile library. "Religious Courtfhip" is another of Mr. De-Foe's works, which is of a tendency very fimilar to that of his "Family Inftructor." He could unite the ferious and the gay with admirable effect; "A Journal of the plague Year," though a fiction, was written in fo very natural and interefting a manner, that it was taken by Dr. Mead for real hiftory. Befides the works already mentioned, De-Foe was the author of many others, of which an account is given in the Biographia Britannica. He died on the 26th of April, 1731, in the parifh of St. Giles's, Cripplegate, leaving behind him a widow and feveral children. De-Foe poffeffed much merit as a citizen, and as a writer. His profe works are much more valuable than his poetical performances. As a political writer, he had great merit; his fentiments appear to have been generally juft, and he expreffed himfelf with force and perfpicuity. His pieces on the fubject of trade and commerce, place him in the foremoft rank among his contemporaries. "Were we," fays his biographer, "to compare De-Foe with Davenant, it would be found that Davenant has more detail from official documents; that De-Foe has more facts from wider inquiry. Davenant is more apt to confider laws in their particular application; De-Foe more frequently inveftigates commercial legiflation in its general effects. From the publications of Davenant it is fufficiently clear, that he was not very regardful of the means, nor very attentive to the confequences; De-Foe is more correct in his motives, and more falutary in his ends." Biog. Brit.

DEFOLIATA. See DECIDUOUS and LEAF.

DEFORCEMENT, in *Law*, a withholding lands or tenements, by force, from the right owner. (Co. Litt. 277.) In this extenfive fenfe it includes an abatement, an intrufion, a diffeifin, or a difcontinuance, as well as any other fpecies of wrong, whereby he that hath a right to the freehold is kept out of poffeffion. But as contradiftinguifhed from thefe, it is only fuch a detainer of the freehold, from him that hath the right of property, but never had any poffeffion under that right, as falls not under any of thofe terms. As in cafe where a lord has feignory, and lands efcheat to him *propter defectum fanguinis*, but the feifin of the lands is withheld from him; here the injury is not *abatement*, for the right vefts not in the lord as heir or devifee; nor is it *intrufion*, for it vefts not in him who hath the remainder or reverfion; nor is it *diffeifin*, for the lord was never feized; nor does it at all bear the nature of any fpecies of *difcontinuance*; and it muft, therefore, be a *deforcement*. (F. N. B. 143.) If a man marries a woman, and, during the coverture, is feized of lands, and alienes, and dies; is diffeifed and dies; or dies in poffeffion; and the alienee, diffeifor, or heir, enters on the tenements, and doth not affign the widow her dower; this is alfo a deforcement to the widow, by withholding lands to which fhe hath a right. (F. N. B. 147.) In like manner, if a man leafe

leafe lands to another for a term of years, or for the life of a third perfon, and the term expires by furrender, efflux of time, or death of the *ceftuy que vie*; and the leffee, or any ftranger, who was, at the expiration of the term, in poffeffion, holds over, and refufes to deliver the poffeffion to him in remainder or reverfion, this is likewife a deforcement. (Finch. L. 263. F. N. B. 201—5, 6, 7.) Deforcements may alfo arife upon the breach of a condition in law; as if a woman gives lands to a man by deed, to the intent that he marry her, and he will not when thereunto required, but continues to hold the lands; this is fuch a fraud on the man's part, that the law will not allow it to diveft the woman's right of poffeffion; though, his entry being lawful, it does diveft the actual poffeffion, and thereby becomes a deforcement. (F. N. B. 205.) Deforcements may be alfo grounded on the difability of the party deforced; as if an infant makes an alienation of his lands, and the alienee enters, and keeps poffeffion; now, as the alienation is voidable, this poffeffion as againft the infant (or, in cafe of his deceafe, as againft his heir) is, after avoidance, wrongful, and, therefore, a deforcement. (Finch. L. 264. F. N. B. 192.) The fame happens, when one of non-fane memory alienes his lands or tenements, and the alienee enters and holds poffeffion, this may alfo be a deforcement. (Finch. L. 264. F. N. B. 202.) Another fpecies of deforcement is, where two perfons have the fame title to land, and one of them enters and keeps poffeffion againft the other; as where the anceftor dies poffeffed of an eftate in fee-fimple, which defcends to two fifters as coparceners, and one of them enters before the other, and will not fuffer her fifter to enter and enjoy her moiety; this is alfo a deforcement. (Finch. L. 293, 294. F. N. B. 197.) Deforcement may be alfo grounded on the non-performance of a covenant-real; as if a man feifed of lands, covenants to convey them to another, and neglects or refufes fo to do, but continues poffeffion againft him; this poffeffion, being wrongful, is a deforcement (F. N. B. 146.); whence, in levying a fine of lands, the perfon, againft whom the fictitious action is brought upon a fuppofed breach of covenant, is called the deforciant. And, laftly, by way of analogy, keeping a man by any means out of a freehold office is conftrued to be a deforcement; though, being an incorporeal hereditament, the deforciant has no corporeal poffeffion. So that whatever injurious withholding the poffeffion of a freehold is not included under *abatement*, *intrufion*, *diffeifin*, or *difcontinuance*, is comprifed under *deforcement*. Blackft. Com. vol. iii. p. 174.

Deforcement, in the law of Scotland, is ufed for the refifting, or offering violence to the officers of the law, while they are actually employed in the exercife of their functions, by putting its order and fentences in execution; whether they be officers of the fupreme courts of juftice, as heralds, purfuivants, meffengers, macers; or of inferior courts, as mayors.

The punifhment of this crime is confifcation of moveables, joined with fome arbitrary punifhment; as fine, imprifonment, banifhment, or corporal pains, according to the degree of violence, and other circumftances which aggravate the crime; befides, the party aggrieved may have an action of damages, to be highly taxed out of the firft and readieft of the offender's efcheat, or other eftate. See Bayne's Criminal Law.

Deforcing of officers of the cuftom-houfe, is provided againft by the fame ftatutes as in England.

DEFORCER, or Deforciant, one that cafts out another from his lands, or tenements, by mere force. See Deforcement.

DEFORMITY is immediately oppofed to beauty, and denotes the want of that uniformity, fymmetry, and variety neceffary to conftitute beauty. Accordingly, Dr. Hutchefon defines it by the abfence of beauty, or a deficiency in the beauty expected in any fpecies. Deformity and beauty may be confidered either as natural or moral. Thefe are both referred by the above-mentioned ingenious writer to an internal fenfe, and our perceptions of them, as he fuppofes, arife from an original arbitrary ftructure of our own minds, by which certain objects, when obferved, are rendered the occafions of certain fenfations and affections.

That many objects give no pleafure to our fenfe, is obvious. Many are certainly void of beauty; but then, fays this author, there is no form which feems neceffarily difagreeable of itfelf, when we dread no other evil from it, and compare it with nothing better of the kind. Many objects are naturally difpleafing, and diftafteful to our external fenfes, as well as others pleafing and agreeable; as fmells, taftes, and fome feparate founds: but with regard to our fenfe of beauty, no compofition of objects which give not unpleafant fimple ideas, feems pofitively unpleafant, or painful of itfelf, had we never obferved any thing better of the fame kind.

Had there been a fpecies of the form which we now denominate ugly, or deformed, and had we never feen or expected greater beauty, we fhould have received no difguft from it; though the pleafure would not have been fo great in this form as in thofe we now admire. Our fenfe of beauty feems defigned to give us pofitive pleafure; but not pofitive pain or difguft, any farther than what arifes from difappointment.

There are, indeed, many faces which, at firft view, are apt to raife diflike. But this is generally not from any pofitive deformity, but either from want of expected beauty, or from the carrying fome natural indications of morally bad difpofitions, which we all acquire a faculty of difcerning in countenances, airs, and geftures. That this is not occafioned by any form pofitively difgufting, appears hence, that if, upon long acquaintance, we are fure of finding fweetnefs of temper, humanity, and cheerfulnefs, though the bodily form continues, it fhall give us no difguft. There are horrors raifed by fome objects, which are only the effect of fear for ourfelves, or compaffion towards others, when either reafon, or fome foolifh affociation of ideas, makes us apprehend danger, and not the effect of any thing in the form itfelf. For we find that moft of thofe objects, which excite horror at firft, when experience or reafon has removed the fear, may become the occafion of pleafure.

The cafual conjunction of ideas gives us difguft, where there is nothing difagreeable in the form itfelf. And this, in effect, is the caufe of moft of our fantaftic averfions to the figures of diverfe animals, &c. Thus, ferpents of all kinds, and many infects, really beautiful enough, are beheld with averfion by many people, who have got fome accidental ideas of mifchief affociated to them. A fimilar reafoning is applied to our perception of moral beauty and deformity. Inquiry into the Original of our Ideas of Beauty and Virtue, paffim.

But it is more juft to diftinguifh between the fentiments of delight or difguft, excited in us by beautiful or deformed objects, which are effects of fome caufes, and the natural and real qualities of the perceived objects by which they are produced. There are objects, fays an excellent writer, which have a natural aptitude to pleafe or offend, or between which and the contemplating mind there is a neceffary congruity or incongruity; and though the actual perception of the underftanding, and confequent feeling of the heart, in

contemplating

contemplating the actions and affections of moral agents may exist in very different degrees, on account of the incidental obstructions, arising from bodily indisposition, mental prejudices and biasses, and the association of ideas; yet, to every rational mind properly disposed, morally good actions must for ever be acceptable, and can never of themselves offend; and morally evil actions must for ever be disagreeable, and can never of themselves please. What is right in actions and characters is beautiful and amiable, and gives pleasure; what is wrong is deformed and odious, and excites disgust: right and pleasure, wrong and pain, are as distinct as cause and effect. It is no less absurd to maintain, that the perception of virtue is nothing distinct from the reception of the pleasure resulting from it, than to infer, with some metaphysicians, that solidity, extension, and figure, are only particular modes of sensation, because attended whenever they are perceived with some sensations of sight or touch. Thus does this author shew, that moral beauty and deformity are real qualites of certain actions; in which consists their aptitude to please or disgust. With respect to natural beauty, he observes, that uniformity amidst variety pleases, because of the natures of variety and uniformity, which are such, that, whenever united, they are adapted to please every free unbiassed mind that discerns them. He accounts for the pleasure they afford, without referring them to an arbitrary, internal sense, by the following circumstances that attend them. They are more easily comprehended by the mind: order and symmetry give things their stability and strength, and subserviency to any valuable purpose; regularity and order evidence art and design. Disorder and confusion, whence deformity arises, denote only the negation of regularity and order; or any arrangement and disposition of things, which are not according to a law, rule, or plan, and prove not design. These are not positively displeasing; except where we previously expected order, or where impotence or want of skill appear, and the contriver has either failed of his design, or executed it ill. See on this subject Dr. Price's Review of the principal Questions and Difficulties in Morals, ch. ii. passim. See an admirable Essay on Bodily Deformity, by Mr. Hay, in the Fugitive Pieces, vol. i. p. 93, &c. See BEAUTY.

DEFOSSION, *Defossio*, the punishment of burying alive, inflicted, among the Romans, on Vestal virgins guilty of incontinency. It is also a custom among the Hungarians to inflict this punishment on women convicted of adultery. Heretics also were punished in this manner. See BURIAL.

DEFTARDAR, or DEFTERDAR, or *Tefterdar-effendi*, the treasurer of the revenues of the Turkish empire, or the minister of the finances.

The word is compounded, first, of *defter*, a Turkish name for a book, register, memoir, &c. which Meninski derives from the Greek διφθέρα, the skin or parchment anciently wrote on. The second word, whereof deftardar is compounded, is *dar*, a Turkish and Persian word, signifying *keeping* or *holding*, *q. d.* book-keeper of the monies received and expended.

Meninski calls him *supremus thesaurarius*, high treasurer; and *præses cameræ*, president of the exchequer. Castellus makes him the keeper and comptroller of the books of receipts and payments.

The deftardar, or as Vigenere calls him, dephterderi, has in his charge the rolls and accounts of the militia, and the treasury: he receives all the grand signior's revenues, pays his forces, and furnishes the expences of all public affairs: in which his office differs from that of khasné-veliki, a black eunuch, who is charged with the general administration of the interior imperial treasure, into which is poured the produce of the confiscations and inheritances that serve for the support of the seraglio. The presents, the effects, the jewels which are sent by foreign powers, those acquired by conquest, the colonies, &c. constitute a part of this treasure. This treasurer or minister of the finances is also different from the chaznadar or khasnadar-aga, who is one of the pages of confidence, and administers the private treasure of the sultan, as the others do those of the state and of the seraglio. The sultan's private treasure, increased by the savings of the greater number of the sultans, is supported by the profits of the mint, and by some confiscations. The treasure under the management of the tefterdar-effendi consists of the produce of the sale of the great employments, of that which arises from the annual renewal of the barats or firmans, obtained by the zaïms, timariots, and others, the produce of the karatch or capitation-tax on the Jews and Christians, the produce of the farmed domains, that of the customs, &c. &c.

Ricaut makes a deftardar, whom he calls teftardar, in each beglerbeglic, or government. Vigenere assures us, there are but two, the one for Europe, and the other for Asia; the first resides at Constantinople, and has under him two general commissioners, or deputies, one for Hungary, Transylvania, Walachia, Croatia, Servia, Bulgaria, Bosnia, &c. the other for Greece and the Morea, with the islands of the Archipelago.

Each of these has under him as many sub-commissioners, or agents, as there are sangiackats in his province; which sub-commissioners have as many clerks as there are asbassis in their sangiackat, to keep the account of the timariots in their districts. The deftarder of Asia has two general deputies, the one for Anatolia; the other for Syria, Arabia, and Egypt: these have likewise their sub-agents, clerks, &c. as those of Europe.

DEGAGNAC, in *Geography*, a town of France, in the department of the Lot; 4½ leagues N. of Cahors.

DEGENERATION, the act of failing, or declining from a more perfect, or valuable kind, state, or condition, to an inferior or worse.

M. Buffon is a strenuous advocate for the degeneration of animals, and he ascribes it to three causes, *viz.* the temperature of the climate, the quality of the food, and the evils produced by slavery. Whenever man, he says, began to change his climate, and to migrate from one country to another, his nature became subject to various alterations, which were greater or less in proportion to the distance of his removal from the situation which he originally occupied. During the lapse of ages, and after he had traversed whole continents, intermixing with those who had already degenerated under the influence of different climates; after he was habituated to the scorching heats of the south, and the frozen regions of the north; he underwent changes so considerable and so conspicuous as to furnish occasion for suspecting, that the Negro, the Laplander, and the White, were really different species, if we were not previously assured, on the one hand, that one man only was originally created, and, on the other, that the White, the Laplander, and the Negro, are capable of uniting and of propagating the great and undivided family of the human kind. Hence he concludes, that those marks which distinguish men who inhabit different regions of the earth are not original, but purely superficial. It is the same identical being, who is varnished with black under the torrid zone, and tawned and contracted by extreme cold under the polar circle. Man, he says, is the same in both the two great continents into which the earth is divided. The Asiatic, the European, and

and the Negro, produce equally with the American; nor can any thing, as this ingenious writer maintains, be a ſtronger proof that they belong to the ſame family than the facility with which they unite to the common ſtock. The blood is different, but the germ is the ſame. The ſkin, the hair, the features, and the ſtature, have varied, without any change in the internal ſtructure. The type is general and common; and if, by any great revolution, man was forced to abandon thoſe climates which he had invaded, and to return to his native country, he would, in the progreſs of time, reſume his original features, his primitive ſtature, and his natural colour. But this effect would be produced much ſooner by the mixture of races. A white male with a black female, or a black male with a white female, equally produce a mulatto, whoſe colour is brown, or a mixture of black and white. This mulatto, intermixing with a white, produces a ſecond mulatto leſs brown than the former; and if the ſecond mulatto unites with a white, the third will only have a ſlight ſhade of brown, which will entirely vaniſh in future generations. Hence, by this mixture, 150 or 200 years are ſufficient to bleach the ſkin of a Negro. The influence of climate produces this change by ſlow degrees, and in a ſeries of ſeveral centuries; but great as this alteration is, it is only ſuperficial. The colour of the ſkin, hair, and eyes, varies by the influence of climate alone. The other changes, ſuch as thoſe of ſtature, figure, features, and quality of the hair, ſeem to require the joint operations of climate and other cauſes. The moſt direct and general of theſe concurring cauſes is the quality of the food. It is chiefly by aliment that man receives the influence of the ſoil which he inhabits; whilſt that of the air and climate acts more ſuperficially. While the climate changes the colour of the ſkin, food acts upon the internal form by its qualities, which are always related to thoſe of the earth by which it is produced. In the ſame country we perceive ſtriking differences between thoſe who occupy the heights and thoſe who inhabit the low grounds. The inhabitants of the mountains are always better made, more lively, and more beautiful, than thoſe of the valley. Hence, in countries remote from the original climate, where the herbs, fruits, grains, and the fleſh of animals, differ both in quality and ſubſtance, the men who feed upon theſe articles muſt, in a courſe of years, undergo ſtill greater changes. But it requires ages, in the conſtant uſe of the ſame food, to change the features, the ſize of the body, and the ſubſtance of the hair, and to produce thoſe internal alterations, which, when perpetuated by generation, become general and permanent characteriſtics which diſtinguiſh the different races and nations that compoſe the aggregate of the human ſpecies.

With regard to brute animals, theſe effects are greater and more ſuddenly accompliſhed; becauſe they are more nearly allied to the earth than man; becauſe their food, more uniformly the ſame, and ſubject to no preparation, has qualities more determinate and of more powerful influence; and becauſe the animals, being unable to clothe themſelves, or to uſe the element of fire, operations which require the ſkill of man, remain perpetually expoſed to the action of the air, and all the inclemencies of the climate. Animals are more fixed in their habitation than man, and continue for a longer interval of time in ſituations that are beſt adapted to their conſtitution. But when they are forced by men, or by any revolution on the globe, to abandon their native ſoil, their nature undergoes changes ſo great, that, in order to recognize them, recourſe muſt be had to accurate examination, and even to experiment and analogy. If to theſe natural cauſes of alteration in free animals, we add that of the empire of man over thoſe which he has reduced to ſlavery, we ſhall be aſtoniſhed at the degree to which tyranny can degrade and disfigure nature; we ſhall perceive the marks of ſlavery, and the prints of her chains; and we ſhall find, that theſe wounds are deeper and more incurable in proportion to their antiquity; and that, in the preſent condition of domeſtic animals, it is perhaps impoſſible to reſtore their primitive form, and thoſe attributes of nature of which we have deprived them.

M. Buffon examines, in detail, the operation and effect of the cauſes above-ſpecified. and, by ſo doing, exhibits a picture of nature in her preſent condition contraſted againſt what he conceives it to have been before her degradation. The firſt animal, which he contemplates in its original ſtate and in that of its degeneration, is the ſheep, compared with the mouflon, from which the modern animal derives its origin. The mouflon, ſays this author, is a large, ſwift, ſtrong animal, armed with horns and thick hoofs, covered with coarſe hair, and dreading neither the inclemency of the ſky nor the voracity of the wolf. How different from our ſheep, who ſubſiſt with difficulty in flocks, who are unable to defend themſelves by their number, who cannot endure the cold of our winters without ſhelter, and who would all periſh, if man withdrew his protection! Timidity, weakneſs, reſignation, and ſtupidity, are the only melancholy remains of their degraded nature. To obtain fine wool, ſays this ingenious writer, our rams ſhould have Barbary ewes; and to augment the ſize, our ewes ſhould be ſerved with the male mouflon. Our goats might be managed in the ſame manner. By intermixing them with the goat of Angora, their hair might be changed, and rendered equally uſeful as the fineſt wool. In our climate the ſpecies of the goat is not ſo much degenerated as that of the ſheep. It appears to be ſtill more degenerated in the warm countries of Africa and India. The ſpecies of the ox is more influenced by nouriſhment than that of any other domeſtic animal. The influence of food is in general greater, and produces more ſenſible effects upon ſuch animals as feed on herbs or fruits. Carnivorous animals, on the contrary, are leſs affected by this cauſe than by the influence of climate; becauſe fleſh is an aliment already aſſimilated to the nature of the animal by which it is devoured; but graſs is the firſt product of the ſoil, and has all the properties of it; and theſe terreſtrial qualities are immediately communicated to the animal. Accordingly the dog ſpecies, upon which food ſeems to have a very ſlight influence, is more varied than that of any other carnivorous animal. In his degradations, he ſeems to follow exactly the differences of climate. In the warmeſt climates he is naked, covered with a coarſe thick hair in the northern regions, and adorned with a fine ſilky robe in Spain and in Syria, where the mild temperature of the air converts the hair of moſt animals into a kind of ſilk. But independently of the external varieties produced by the influence of climate, the dog is ſubject to other changes, which proceed from his ſituation, his captivity, or the nature of the intercourſe he holds with man. Of all the varieties of dogs, the ſhepherd's dog ſeems to be the leaſt degenerated; and he is likewiſe the moſt uſeful for guarding our flocks, and for the preſervation of good order. His race ought, therefore, to be more multiplied than thoſe of other dogs, who miniſter only to our amuſements, and whoſe number is ſo great that, in every town and village, the proviſions conſumed by them would nouriſh many families. The domeſtic ſtate has greatly contributed to vary the colour of animals, which, in general, was originally brown or black. The dog, the ox, the goat, the ſheep, the horſe, have aſſumed all kinds of colours. The dog has changed from black to white; and pure white, without any ſpots, ſeems to mark the laſt de-

gree of degeneration, and is generally accompanied with eſſential imperfections. All quadrupeds which are abſolutely white have thoſe faults of dullneſs of hearing and red eyes, which are obſervable in the race of white men. This kind of degeneration, though more frequent among domeſtic animals, ſometimes appears among the wild ſpecies, as in thoſe of the elephant, ſtags, fallow-deer, monkeys, moles, and mice; in all which this colour is uniformly accompanied with ſmaller or greater degrees of bodily weakneſs, and bluntneſs of the ſenſes. But ſlavery ſeems to have made the deepeſt and moſt conſpicuous impreſſions on the camel. He is brought forth with bunches on his back, and calloſities on his breaſt and knees. The wild animals, not being under the immediate dominion of man, are not ſubject to ſuch great changes as the domeſtic kinds. Their nature ſeems to vary with different climates; but it is no where degraded. If they were capable of chuſing their climate and their food, the changes they undergo would be ſtill leſs: but as they have at all times been hunted and baniſhed by man, and even by the ſtrongeſt and moſt ferocious quadrupeds, moſt of them have been obliged to abandon their native country, and to occupy lands leſs friendly to their conſtitution. The aſs, though ſubjected to the preſſure of the moſt wretched ſervitude, has undergone few changes; for his nature is ſo obdurate, that it equally reſiſts bad treatment and the inconveniences of a foreign climate and of coarſe food. The elephant is the only quadruped upon which the domeſtic ſtate has had no influence; becauſe, in this ſtate, he refuſes to propagate, and, of courſe, does not tranſmit to his ſpecies the blemiſhes or defects occaſioned by his unnatural condition.

Having ſurveyed the variations peculiar to each ſpecies, M. Buffon directs his attention to the moſt important change of the ſpecies themſelves. This, he ſays, is the moſt ancient degeneration; and it ſeems to have taken place in each family, or in each genus, under which the contiguous ſpecies may be comprehended. By comparing all the quadrupeds, and ranking each under its own genus, this author concludes, that the 200 ſpecies, whoſe hiſtory he has given, may be reduced to a ſmall number of families or principal ſtems, from which all the others have probably derived their origin. All the animals common to both continents, and all thoſe which are peculiar to the Old World, are reduced, by this author, to fifteen genera, and nine ſolitary or detached ſpecies; which he enumerates. Of theſe, ſeven genera and two ſpecies, *viz.* the bear and mole, are common to both continents; and hence he infers, that there remain only eight genera and fifty detached ſpecies, which are peculiar to the Old World. By purſuing the inveſtigation, and enumerating the animals peculiar to the New World, he finds, that there are about fifteen different ſpecies, which may be reduced to ten genera, and four detached ſpecies. Theſe, though they differ from the animals of the Old Continent, have remote relations which ſeem to indicate ſomething common in their formation, and lead us to cauſes of degeneration more ancient, perhaps, than all the others. Accordingly he ſuppoſes, that all the animals of the New World are much ſmaller than thoſe of the Old. This great diminution in magnitude, whatever be the cauſe of it, is a primary kind of degeneration, which could not happen without having a conſiderable influence on the figure of all theſe animals; and in comparing them, we muſt not loſe ſight of this firſt effect. For further particulars we muſt refer to the author himſelf, and to the article CLIMATE in this dictionary.

DEGENERATION *of Plants*, in *Botany*. See PLANTS.

DEGLIGI, in *Geography*, a town of the iſland of Ceylon; 16 miles N.E. of Candy.

DEGLUTITION, in *Phyſiology*, is the act of ſwallowing; or the paſſage of the food, after its maſtication has been performed in the mouth, into the ſtomach.

Moſt animals take their food into the mouth by means of the jaws themſelves; for very few poſſeſs hands. Hence the jaws are much longer in almoſt every quadruped than in man, and are continued, in an elongated and ſlender form, beyond the reſt of the head, to admit of the mouth being opened more widely, and of the food being ſeized more conveniently. They draw in fluids by the action of the tongue, previouſly rendered concave for that purpoſe.

The hands are uſed, in the human ſubject, for introducing both ſolids and fluids into the mouth; although the latter can be taken in by means of ſuction. The harder ſubſtances, being introduced into the mouth in maſſes, which are either too large for ſwallowing, or which would be unfit for the action of the ſtomach in a ſtate of aggregation, are reduced into ſmaller portions, and into a ſofter conſiſtence, by the proceſs of chewing or maſtication. Even the fluid aliments, which do not require this reduction, have to paſs from the mouth to the throat, and require, therefore, the action of particular organs deſtined for their propulſion.

The proceſs of chewing, being a neceſſary preliminary to the act of ſwallowing, will be conſidered in the firſt place. The immediate agents in this function are the two rows of teeth, implanted in the alveolar portions of the upper and lower jaw-bones, acting on the food by means of the motions of the lower jaw; and aſſiſted in their office by the lips, cheeks, and tongue. For the deſcription of the teeth, and of the bones which form the joint of the lower jaw, the reader is referred to the article CRANIUM. Our obſervations on the remainder of the ſubject will include, 1ſt, A deſcription of the joint of the lower jaw; 2dly, An explanation of its motions; and, 3dly, A deſcription of the muſcles which move it. The *mouth*, or cavity in which the act of chewing is performed, will form the next diviſion of the article: and here we ſhall give a deſcription, 1ſt, of the mouth in general; 2dly, of the lips and cheeks, with their muſcles; 3dly, of the palate, ſoft palate, and its muſcles; 4thly, of the tongue and its muſcles, including the os hyoides and the hyoidal muſcles; 5thly, of the ſalivary glands, and other glandular apparatus of the mouth, furniſhing the fluids that ſoften and dilute the food during its maſtication; 6thly, of the paſſage from the mouth into the pharynx, and the propulſion of the food through that opening. The laſt named membranous bag, which receives the food, and drives it downwards to the ſtomach, will form the third part of the article; which will be concluded with an account of the œſophagus, that conveys the food from the pharynx into the ſtomach.

Joint of the lower Jaw.—This articulation is formed between the glenoid cavity and eminentia articularis of the temporal bone on one ſide, and the condyle of the lower jaw on the other. The oppoſed ſurfaces are furniſhed with two thin cartilaginous coverings, of which one is common to the articular eminence of the temporal bone, with that portion of the glenoid cavity which is in front of the fiſſura Glaſeri; and the other belongs to the condyle. The bones are held together by three ligaments; and the joint poſſeſſes alſo a ſynovial membrane, and an interarticular cartilage. The external ligament ariſes from the root of the zygomatic proceſs of the temporal bone, deſcends obliquely backwards, and is attached to the outer part of the neck of the condyle. It conſiſts of cloſely united parallel ſhining fibres, and adheres firmly to the capſule and interarticular cartilage. The internal ligament, which is not ſo ſtrong and diſtinct as the former, is continued obliquely downwards and forwards, from the ſpinous proceſs of the ſphenoid bone to the orifice of

of the canal of the lower jaw. The ftylo-maxillary ligament can fcarcely be confidered as having any concern with the articulation. It is a thin and fmall aponeurotic chord, extended from the ftyloid procefs to the angle of the lower jaw, where it is fixed between the infertions of the maffeter and pterygoideus internus. The ftylogloffus mufcle is attached to a confiderable length of this ligament. The fynovial membrane, or capfule of the joint, confifts of two parts, which cannot indeed be very clearly diftinguifhed from each other. The fuperior divifion covers the articular eminence, and the upper furface of the articular cartilage; and is continued from one of thefe parts to the other, at the circumference of each. The lower divifion covers the inferior furface of the cartilage, and is reflected from its margin to the condyle, being continued lower down on the pofterior than on the anterior furface of the laft-mentioned eminence. Thus the joint of the lower jaw confifts of two clofed cavities, having no communication with each other. The fynovial membranes, which form thefe bags, are loofe where they are reflected from the articular cartilage to the bones, particularly on the anterior and pofterior afpects of the joints, and are covered by cellular fubftance. There is a fmall fynovial gland near the glenoid cavity. The cartilage of the lower jaw is of an oval figure, interpofed between the maxillary condyle and the bafe of the fkull; its two furfaces are adapted to thofe parts of the bones which come in contact with it. It is concave on the front, and convex on the back part of its upper furface, to correfpond to the articular eminence and glenoid cavity. Below it is concave, as it is applied only to the convexity of the condyle. Its two furfaces are clofely covered by the correfponding portions of fynovial membrane; the circumference is free between the reflexions of thefe membranes, except externally, where the outer ligament has a connection, and towards the front, where a few fibres of the external pterygoid mufcle are attached. It is thicker in the circumference than towards the centre, and may nearly equal the thicknefs of half a crown in the former fituation; it is alfo thicker behind at the glenoid cavity than towards the front, where it is interpofed between the convexities of the articular eminence and condyle. It is fometimes penetrated by a hole in the middle, and then the two fynovial membranes communicate with each other. It poffeffes the fame fibrous ftructure as the other articular cartilages; the fibres, which are concentric, are moft evident towards the circumference.

Motions of the Jaws.—The mechanifm of the face may be confidered under two points of view; 1ft, as affecting the bones, which conftitute the upper jaw; 2dly, that of the lower jaw. Refiftance and folidity feem to have been the objects attended to in framing the former; and facility of motion in the latter.

Mechanifm of the upper Jaw.—Force is applied to the upper jaw in three directions; 1ft, from below upwards, which is the moft ordinary cafe, as it takes place in maftication; 2dly, from before backwards; 3dly, from fide to fide. It is very feldom that any impulfe or fhock is received from above downwards. By the elevation of the lower jaw-bone, motion is chiefly tranfmitted, and the ftrongeft impulfe communicated to the dental margin of the upper. Hence the points of refiftance, or the fupports of the latter, correfpond to this fituation. The palatine arch, feparating the mouth and nofe, and placed behind and within the above-named margin, receiving little or no impulfe towards its middle, is furnifhed with a very flender fupport in that fituation. The nafal feptum indeed feems rather defigned to divide the cavities, from which its name is derived, than to concur in the latter object, to which its ftrength is manifeftly inadequate. Moreover, as it is connected above to the thin cribriform plate, any ftrong impulfe communicated in that direction might produce an injurious effect on the brain. We muft turn our attention, therefore, chiefly to the dental margin of the upper jaw, in examining the refiftance which is experienced by the lower maxillary bone. And in this fituation its fupports are derived; in front, from the nafal proceffes of the upper jaw bones; and behind, from the malar bones, which, as well as the proceffes juft mentioned, are again fuftained by the os frontis. Hence the upper jaw will refift the moft powerfully in thefe two directions; and two intervals may be noticed between thefe points, in which no fupport is afforded; *viz.* the opening of the nofe, and the orbits. The fituation of the teeth is accommodated to this circumftance. The incifors, which are formed for the purpofe of cutting foft kinds of food, are placed under the fpace left at the entrance of the nofe. The cufpidati, adapted by their fize and ftrength for tearing tough and hard fubftances, are fupported by the nafal apophyfes; while the molar teeth, which bruife and finally comminute the food, are placed in the moft refifting portion of the alveoli, *viz.* that which is fupported by the cheek-bone. The bicufpides, although found under the orbits, are fufficiently fupported by the union of the nafal apophyfes with the cheek-bones. The motion then communicated to the dental margin of the upper jaw is tranfmitted to the frontal bone, at its internal and external orbitar proceffes. The ethmoid may likewife tranfmit a fmall part of the impulfe, fince it alfo is placed between the frontal and upper jaw-bones. The os malæ, which is impelled in this way upwards, is furnifhed with a point of refiftance behind, in the zygomatic portion of the temporal bone; and in that circumftance confifts the advantage of the mode in which the latter overlaps the former. The preceding confiderations render it very evident that all the impulfe, tranfmitted from the lower to the upper jaw, is ultimately communicated to the cranium, and there loft. Hence it has been inferred, that if, in cafes of fracture, a refifting body be held between the teeth, and thrown into vibration; or if a hard body, as a nut, be cracked between the teeth; that the impulfe thus produced would occafion motion, and confequently pain in the place of the injury: and the older writers have even infifted on thefe figns as affording indications under doubtful circumftances. They appear to us more like the offspring of the imagination, than the refult of obfervation and experience; yet we may often feel a kind of fhock in the fkull, when we exert the powers of maftication very ftrongly. Let us make one more remark on the latter fubject; that the upper incifor teeth flip over the lower ones, like the blades of fciffars; and that their flattened form and their edges favour this kind of motion, by which the interpofed fubftances are cut in pieces. The cufpidati overlap a little; but the grinders, which bruife the folid parts of the food, meet together in the fame vertical line.

Impulfe can be produced in the fecond direction, only by external objects; as in the cafe of a blow or fall on the face. The pterygoid proceffes and the zygomatic arches are the refifting points, which fuftain the effort in thofe cafes; and it is tranfmitted from thefe to the cranium. Perfons have fuppofed that a fhock, affecting the front of the nofe, might be tranfmitted to the brain through the feptum narium. But that part is too weak for fuch an effort, which, in point of fact, does not feem ever to occur.

The propagation of a lateral fhock cannot be eafily eftimated, fince there is no fupport oppofite to the part ftricken. But it muft no doubt be loft in the fide of the head.

The upper jaw will be found to move a little when the

 mouth

mouth is opened; but the motion is common to the whole of the cranium with the jaw. The back of the head defcends, while the front is flightly elevated; and the motion takes place between the occipital condyles and the atlas. The quantity of this movement is very fmall, fo that phyfiologifts in general have overlooked it altogether, and have agreed almoft univerfally in ftating that the mouth is opened by the depreffion of the lower jaw only. Haller and others have indeed been aware that the upper jaw could be moved in the manner juft mentioned (Elementa Phyfiol. tom. vi. p. 10.); but they do not feem to know that fuch a motion takes place in ordinary cafes. For the author laft quoted expreffes himfelf thus: "motum, quo os aperitur, *maxillâ inferiori non motâ*, fed capite retrorfum ducto, per biventrem." Any individual may fatisfy himfelf, that his upper jaw does afcend, when the mouth is opened, if he will ftand oppofite to a looking-glafs, holding the point of a knife juft againft the lower edge of the upper teeth, and then open his mouth.

Mechanifm of the lower Jaw.—This may be depreffed, elevated, moved backwards, forwards, and to either fide. In the depreffion, which is the principal means of opening the mouth, the condyle firft turns a little on its own axis in the glenoid cavity, fo that the upper part becomes rather anterior; the angles of the bone move backwards, and the coronoid proceffes defcend. When the depreffion is flight, no further effect is produced; but if a more confiderable opening of the mouth be needed, the condyle is carried fuddenly forwards under the articular eminence of the temporal bone. This motion can be felt by placing the finger on the outer end of the condyle in the living fubject; and it can be demonftrated by moving the jaw, with the articulation diffected, in the dead body. The cartilage is carried forwards with the condyle; the rotation of which going on at the fame time, its pofterior portion is brought into contact with the articular eminence. The angle is carried farther and farther backwards, fo that it moves juft in an oppofite direction to the condyle; the external ligament is rather tenfe, as well as the pofterior part of the upper fynovial membrane; and the ftylo-maxillary ligament is relaxed. If the depreffion be carried to a very great extent, and be combined at the fame time with a motion forwards, the condyle may become difplaced, by flipping in front of the articular eminence.

The elevation of the jaw is effected by a motion of the bone in an inverfe direction to that which has been juft defcribed. The condyle placed under the articular eminence performs a rotatory movement, by which that part, which was before turned forwards, is directed upwards; and then the whole eminence returns into the glenoid cavity. When arrived in that part, it ftill continues to turn upon itfelf, until the motion is arrefted by the lower teeth meeting the upper ones. If the depreffion has been inconfiderable, the elevation is effected by that part only of the motion, which takes place in the glenoid cavity. The meeting of the teeth prevents the lower jaw from being ever elevated fufficiently to produce a luxation backwards; which indeed is ftill further prevented by the meatus auditorius and proceffus vaginalis. In this motion the external ligament is relaxed; the ftylo-maxillary becomes rather tenfe; and the pofterior part of the upper fynovial membrane, which is naturally very loofe, becomes folded on itfelf in the cellular fpace behind the fiffura Glaferi.

The jaw is moved forwards without any thing like that revolution, which we have defcribed in the depreffion. The whole bone is moved horizontally; and all the ligaments become equally tenfe. The fuperior fynovial membrane is ftretched at its back part; while the inferior remains in its natural ftate, fince it accompanies the condyle in its motion forwards. For the pterygoideus externus, by which that motion is performed, attaching itfelf to both parts, carries them forwards together. This common infertion is effential for the purpofe of preferving the condyle and cartilage in their proper relative pofitions. If the motion forwards were continued to a great extent, the coronoid procefs would ftrike againft the anterior part of the temporal foffa, and prevent any luxation; for which it is neceffary that that apophyfis fhould be depreffed below the zygoma. The motion of the jaw forwards requires a flight previous depreffion of the condyle, in order to bring its convexity to a level with the articular eminence, under which it is to be carried. But as the cartilage fills up much of the glenoid cavity, this depreffion is very flight.

In the motion backwards, the whole jaw moves horizontally through the fame fpace in which it had paffed forwards; and by a movement precifely the inverfe of that which we have juft defcribed.

The lateral motion of the jaw is not of an horizontal nature. Indeed, if one condyle could be moved horizontally outwards, the other muft be carried proportionally inwards; but the fpine of the fphenoid bone and the proceffus vaginalis are the obftacles to fuch a motion; fo that a luxation inwards or outwards is manifeftly impoffible. If the chin move towards the right, the following is the condition in which the lower jaw-bone is placed. The left condyle remains in the glenoid cavity, and is even more deeply fixed in that depreffion, fo as to form a pivot, on which the reft of the bone turns. The other condyle, which is the part moft remote from the centre of motion, exhibits that motion the moft clearly. It quits the glenoid cavity, moves forwards under the articular eminence, and may even be luxated feparately, if the effort be very confiderable. The ftate of the left joint is then nearly the fame as in the depreffed condition of the jaw. The reader will of courfe underftand that the chin is carried towards the left by a fpecies of movement the inverfe of that now defcribed.

Mufcles moving the lower Jaw.—The temporal mufcle, (temporalis, crotaphites, temporo-maxillien,) which is fmaller in fize in the human fubject than in any of the mammalia, arifes from an extenfive furface at the fide of the cranium. Its origin commences by thin flefhy fibres from the femicircular bony ridge, which, beginning juft behind the orbit, paffes backwards in an arched courfe over the middle of the parietal bone, and then turns forwards and downwards, fo as to become continuous with the bony ridge which feparates the fquamous and maftoid portions of the temporal bone. (For a particular defcription of this ridge, and of the fpace included within it, fee Cranium.) A ftrong and denfe aponeurofis arifes from the whole extent of the temporal ridge, and, covering the mufcle, is implanted firmly in the fuperior edge of the zygoma, and in the outer edge of the orbit. By means of this, a complete cavity is prepared for holding the mufcle; having its inner furface formed of the cranium, and the outer furface of this temporal fafcia; and opening below by the fpace left between the zygoma and the furface of the fkull. The mufcle arifes then in a flefhy form; 1ft, from the whole bony furface included within the temporal ridge, and conftituting the temporal foffa (confifting of a greater or fmaller portion of the four following bones, *viz.* os frontis, temporis, fphenoides, and malæ); 2dly, from the inner furface of the zygoma; and 3dly, from the whole inner furface of the temporal fafcia. From thefe parts two layers of flefhy fibres are produced, an internal and external; and thefe are implanted in a middle

radiated tendon, which is lodged for the greateſt part in the body of the muſcle, but comes out below to be attached to the coronoid proceſs of the lower jaw-bone. It deſcends between the zygoma and the ſide of the ſkull, and is implanted into the apex, the outer and inner margin, and the anterior edge of the coronoid proceſs.

The muſcle is thin above, and grows gradually thicker downwards; it is nearly flat on its two ſurfaces. The fibres have a radiated arrangement, as they paſs from an extenſive ſurface of origin to a ſingle point of inſertion. The anterior fibres paſs rather backwards; the next to theſe deſcend in a ſtraight courſe; and a very conſiderable portion comes obliquely forwards, filling up the ſpace left between the zygoma and the ſquamous portion of the temporal bone, and playing over the root of the zygomatic proceſs.

The temporal muſcle and its faſcia are covered by the aponeuroſis of the fronto-occipitalis; by the anterior and ſuperior muſcles of the ear; by the ſuperficial temporal veſſels and nerves; the zygomatic arch and the maſſeter muſcle.

It elevates the lower jaw, particularly when acting in conjunction with the maſſeter. If the bone has been carried forwards, it is again reſtored to its place, chiefly by means of the poſterior fibres. The anterior portion, which goes obliquely backwards, may concur with the pterygoideus externus in carrying the jaw forwards.

The *maſſeter* (jugo-maxillien) is a ſtrong and thick muſcle, compoſed of an intermixture of tendinous and muſcular fibres, quadrilateral but rather elongated in its figure, and covering the ramus of the lower jaw. It ariſes, 1ſt, from two thirds of the anterior and outer part of the lower edge of the zygoma, by a very ſtrong ſheet of tendon, which, covering a conſiderable part of the muſcle, detaches ſeveral plates from its inner ſurface into the ſubſtance of the part; 2dly, from the poſterior part of the ſame edge by a mixture of tendon and muſcle; 3dly, from the inner ſurface of the zygoma by ſhort tendinous fibres. The firſt portion conſtitutes the chief bulk of the muſcle, and, paſſing obliquely downwards and backwards, is implanted into the angle and neighbouring portion of the ramus of the lower jaw. The fibres of the ſecond claſs, deſcending vertically, are mixed with the former at their inſertion. The laſt diviſion paſſes obliquely forwards, and are inſerted high up in the ramus of the jaw, and near the coronoid proceſs.

This muſcle is covered externally by the platyſma myoides, the parotid gland and its excretory duct, the facial nerve, tranſverſalis faciei artery, zygomaticus and orbicularis palpebrarum muſcles. It covers the ramus of the lower jaw, which is rendered irregular on its ſurface by the attachment of the fibres, and a part of the tendon of the temporal muſcle. Its front edge is ſeparated from the buccinator by adipous ſubſtance.

It elevates the lower jaw, and is particularly employed on thoſe occaſions in which a conſiderable force is exerted; as in maſticating hard ſubſtances, whence its name ſeems to have been derived. In thoſe elevations of the part, which do not require ſo great an exertion, as in ſpeaking, the temporal muſcle is made uſe of. The outer and larger part may contribute ſlightly to move the jaw forwards, while the fibres which ſlope forwards may aſſiſt in reſtoring it. Is this muſcle, or the temporal, or the pterygoideus internus, exerted in depreſſing the head, ſuppoſing the lower jaw to be carried downwards, and to be held in that ſituation? This and the other elevators of the lower jaw are particularly affected by the ſpaſmodic trembling, produced by the action of cold on the ſkin; and are peculiarly ſubject to the attacks of tetanus. Paralyſis, on the contrary, is ſlow in affecting them; and they will be found often to act equally well on both ſides, when the whole face is diſtorted from hemiplegia.

Pterygoideus internus (ſpheno-maxillien) is placed on the inſide of the ramus of the jaw, oppoſite to the maſſeter, to which in figure and ſtructure it has a conſiderable analogy, although it is rather ſmaller in ſize. The aſcending part of the lower jaw-bone is indeed included between the fibres of this muſcle and the maſſeter; although the latter embraces it more cloſely on the outſide, than the pterygoid does internally. Its diſtinguiſhing epithet of *internus* denotes merely that it ariſes from a more internal part of the pterygoid proceſs than the *externus*, and not that it is ſituated more deeply. It ariſes from the whole of the pterygoid foſſa; conſequently from the inner ſurface of the external, and from the outer ſurface of the internal plate, and from the pterygoid proceſs of the os palati. Its fibres, conſiſting, like thoſe of the maſſeter, of an intimate mixture of tendon and muſcle, deſcend and paſs at the ſame time outwards, and ſlightly backwards, to be attached to the angle, and to the inner ſurface of the ramus of the inferior maxillary bone; and are ſometimes mixed, under the edge of the bone, with thoſe of the maſſeter.

The inner ſurface of this muſcle correſponds to the circumflexus palati, to the ſpace ſeparating that muſcle from the conſtrictor pharyngis ſuperior, and lodging ſeveral nerves, veſſels, &c., and to the ſub-maxillary gland. Externally it is ſeparated from the jaw above by the dental and lingual nerves, and by the dental veſſels.

It concurs with the two former muſcles in elevating the lower jaw; and it aſſiſts in moving the bone towards the right or left, when it acts ſeparately.

The three pairs of muſcles now deſcribed unite in producing the elevation of the lower jaw; which is termed biting, when any ſubſtance is intercepted between the upper and lower teeth. Their ſtrength is very conſiderable, as the nature of their office obviouſly requires, and its extent is evinced by various inſtances of exertion. Veſalius mentions a man who could throw behind him an iron bar of twenty-five pounds weight held in the mouth, ſo as to fix it in a beam at the diſtance of thirty-nine feet; and inſtances are not uncommon of perſons balancing on the chin a plank or ladder ſo heavy that they can barely lift it. Haller has collected ſeveral examples, as the elevation of a maſt, and placing it on the ſhoulder; of a table ſix feet broad, with a weight of 60 pounds, hanging to the oppoſite ſide; and of 300 pounds weight, &c. We muſt recollect alſo that theſe exertions require much greater force than the weights would ſeem to indicate; ſince the muſcles are all inſerted near the centre of motion, and the force acts at a conſiderable diſtance from the lever; hence it has been calculated that the whole power would be equal to 1000 or 1800 pounds. Man, therefore, is admirably provided with inſtruments for triturating the food, more powerful indeed than ſeems neceſſary for the reduction of aliments, prepared by the various arts of cookery. Yet theſe are trivial compared to the ſtrength of the correſponding muſcles in predacious animals, where the jaws conſtitute moſt terrible inſtruments of attack and defence, and are able to comminute the bones, which are ſwallowed with the reſt of the prey.

Pterygoideus externus (ſpheni-maxillien) is a thick muſcle, placed obliquely between the pterygoid proceſs and the condyle of the lower jaw. It ariſes from the outer ſurface of the external pterygoid plate, from the neighbouring part of the os palati, and from the ſphenoid bone towards the temporal foſſa. Its fibres paſs obliquely backwards and outwards, and are inſerted into the foſſicula of the front of the condyle,

dyle, and into the articular cartilage of the jaw. It is covered externally by the temporal mufcle, and internal maxillary artery; internally by the pterygoideus internus, and the inferior maxillary nerve, and above by the zygomatic foffa. The right and left mufcles acting in conjunction will carry the two condyles directly forwards under the articular eminence. If the right fhould act feparately, it will carry forwards the condyle of its own fide, and thereby move the chin towards the oppofite fide, and *vice versâ*. It always acts upon the cartilage, as well as upon the condyle.

Digaftricus or *biventer maxillæ inferioris* (mafto-maxillien) is placed at the fide of the upper part of the neck; poffeffes an elongated form; and confifts, as its names imply, of two portions of mufcle joined by a middle tendon. It arifes by a mixture of tendinous and flefhy fibres from the groove within the maftoid procefs, and defcends obliquely forwards and inwards. This, which is called the pofterior belly of the mufcle, grows at firft gradually thicker from its origin; then again decreafes, and is contracted into a roundifh tendinous chord, which paffes through the fibres of the ftylo-hyoideus, or behind that mufcle, and running about half an inch above the os hyoides, is connected to that bone by a thin aponeurotic expanfion. Afterwards it is reflected upwards and forwards at an obtufe angle, and fpreads out into the anterior flefhy belly, which is about an inch in length, advances to the lower edge of the front of the jaw, approximating to the oppofite mufcle, and is inferted into the fuperficial foffa at the fide of the fymphyfis.

The trachelo-maftoideus, fplenius, and fterno-cleido-maftoideus mufcles cover the pofterior flefhy portion of the digaftric, which again in its turn covers the mufcles of the ftyloid procefs, the internal jugular vein, and internal carotid artery; fome branches of the external carotid artery, and the nerves of the ninth pair. The anterior part is placed between the mylohyoideus and latiffimus colli. The fubmaxillary gland, placed between the two divifions of the mufcle, is bounded below by the middle tendon.

The contraction of this mufcle opens the mouth by drawing the front of the lower jaw towards the maftoid procefs; and the fwelling both of its anterior and pofterior portions can be plainly perceived by the finger, when we open the mouth. The office of the digaftricus does not feem to be much connected with the motions of the os hyoides, fince its tendon paffes above that bone, to which it is only connected by a flender aponeurofis, and confequently the curve defcribed by the courfe of the mufcle is flight; now it is only in proportion to the degree of that curvature that the digaftricus taken altogether can have the power of elevating the os hyoides. The anterior portion draws the os hyoides to the jaw, or *vice verfâ*, if the fixed points be changed; the pofterior carries the former bone backwards and upwards. Both will elevate the os hyoides when it is depreffed. If the lower jaw be rendered a fixed point, the digaftric may deprefs the back of the head upon the fpine, and thereby open the mouth by elevating the upper jaw. That this part does more, when the lower maxillary bone is prevented from defcending, is very obvious; and Soemmerring ftates that the circumftance may be obferved particularly in infants when fucking.—(De Corp. Hum. Fabr. t. 3. p. 105.)

Latiffimus colli (platifma myoides, thoraco-facien).—This mufcle confifts of a very thin layer of mufcular fibres, fituated under the fkin of the neck, the whole fide of which is covered by it, and extending over a confiderable part both of the face and cheft. The weaknefs of its fibres is compenfated by its great breadth. Its fituation is under the fkin and adipous membrane. It arifes by fcattered and feparate portions among the cellular membranes at the upper part of the cheft, at one or two inches below the clavicle. Thefe origins cover a part of the pectoralis major, deltoid and trapezius mufcles. Its feparate origins uniting into a broad and thin continuous ftratum, extend upwards, forwards, and inwards, covering the mufcles, veffels, and nerves, of the neck. The two mufcles decuffate each other at the upper part of their inner edge, where they are attached to the lower jaw: they are not quite in contact below. The pofterior edge reprefents an oblique line defcending from the angle of the jaw towards the middle of the fhoulder. When the fibres have arrived at the bafis of the lower jaw, they terminate in two ways. The inner portion is fixed to the fymphifis of the bone, and to its lower edge, juft under the origin of the depreffor anguli oris; a few fibres however pafs over the bone to the integuments of the chin. The outer divifion afcends over the jaw, and turns, when it has arrived on the face, by a gentle fweep, inwards and forwards, to the corner of the mouth. Here its fibres partly terminate in the cellular membrane of the face, and are partly connected with the orbicularis at the corner of the mouth, and with the depreffor anguli oris throughout its whole external edge. The external furface of this mufcle is everywhere connected to the fkin by an adipous membrane, not much charged with fat. On the oppofite afpect, it is in contact, on the cheft, with the pectoralis major, deltoid, and clavicle. On the neck, it covers the greateft part of the fterno-cleido-maftoideus, a part of the omo-hyoideus, the fterno-hyoideus, digaftricus, and mylo-hyoideus; the external jugular vein; the carotid and fuperior thyroideal arteries; the fub-maxillary, and a part of the parotid glands. In the face it lies upon the maffeter, buccinator, and depreffor anguli oris mufcles, and the external maxillary artery and facial vein, &c.

It draws down the fkin of the lateral and lower part of the face, and particularly affifts in depreffing the lower lip, and corner of the mouth. It muft confequently be concerned in expreffing the forrowful and indignant paffions. It alfo acts very principally in depreffing the lower jaw. In all its contractions the integuments muft be thrown more or lefs into tranfverfe wrinkles, and this effect refembles that produced by the panniculus carnofus of animals; but we cannot regard this corrugation as the primary ufe of the mufcle.

Other mufcles affift in depreffing the lower jaw, as thofe which pafs from that bone to the os hyoides, alfo the depreffors of the os hyoides, all which will be defcribed in a fubfequent part of the prefent article. The powers, which we have juft confidered as being concerned in opening the mouth, by carrying the lower jaw towards the cheft, appear exceedingly weak when contrafted with their antagonifts the maffeters, temporal and pterygoid mufcles. The difproportion will be leffened by the circumftance of the depreffors being all inferted at a diftance from the centre of motion, and confequently acting with a very confiderable mechanical advantage. We muft confider alfo that the office of the laftmentioned mufcles requires no great exertion; that when the elevators are relaxed, the weight of the jaw itfelf affifts in the depreffion; and confequently that the depreffors of the jaw hold the fame relation to the elevators, as the extenfors do to the flexors in the trunk and limbs; where all the great efforts are made in the direction of flexion, and extenfor mufcles are required only for the purpofe of reftoring the parts.

The cavity of the mouth is the fpace included between the lips and cheeks on the front and fides; the palatine arch and the foft palate above and behind; the tongue and membrane of the mouth below. It opens to the front by a tranfverfe aperture placed between the two lips, and differing in fize and figure, according to the motions of thofe parts; behind it

 communicates

communicates with the bag of the pharynx. The general direction of the cavity, in the erect position of the body, is horizontal; with the former opening placed directly forwards, and the latter backwards.

The circumference of the palate is terminated on its anterior and lateral aspects by the alveolar portion of the upper jaw, containing the upper series of teeth. The corresponding part of the inferior maxillary bone, with the lower teeth, projects into the mouth below. When the cavity is shut, the two rows of teeth meet together, and divide it into two parts having no communication with each other; *viz.* an outer or front division, situated between the lips and cheeks, on one side, and the outer surface of the teeth and their sockets on the other; and an inner or back part, including the space left within the arches described by the teeth. In the open state of the mouth these two divisions communicate by the wide aperture left between the two rows of the teeth.

The extent of the cavity of the mouth differs in its different directions. When it is shut, the superior surface of the tongue is in contact with the palate, and the lips and cheeks are applied against the teeth; so that there is no cavity or empty space at all in this condition of the organs. When the process of mastication is going on, the tongue and jaw descend, and the lips and cheeks are distended with the food; thus the cavity is increased in all its dimensions. The perpendicular diameter, which in the quiescent state of parts was reduced to nothing, becomes more and more considerable in proportion to the depression of the lower jaw. The measure from side to side, in the first-mentioned state, is the distance between the outer edges of the teeth on each side; and that from before backwards is nearly the same as the last. Both these diameters will be affected considerably by the motions of the lips and cheeks, and will be greater or smaller, according to the distension of those organs.

The cavity of the mouth is lined by a soft and vascular membrane, continuous at the front aperture with the common integuments of the face; extended behind into the pharynx; and differently organized in different parts of its course. From the loose and tumid edges of the two lips, it is produced over their inner surface, and that of the cheeks; bestowing a soft lining on both of these parts. It then covers the outer alveolar plate of the two jaws; and, in its reflection from the lips, it produces, both above and below, a small fold, which confines these parts more closely just at the middle and front part of each maxillary bone. These duplicatures are named the fræna of the lips. Ascending over the outer alveolar plate, it approaches the necks of the teeth, assumes a greater firmness of texture, and forms the gums. On the alveolar edges of the maxillary bones, and, consequently, in the middle of that part which forms the gum, the membrane is perforated by a number of holes equal to that of the teeth; and it adheres closely to the necks of the teeth at the margins of these perforations, where it is also connected with the periosteum that lines the alveoli. It is then continued over the internal alveolar lamina of both jaws; affords a covering above to the bony palate; and is prolonged over the under surface of the soft palate, at the posterior or loose edge of which it becomes continuous with the pituitary membrane of the nose. From the cheek it goes over the ramus of the jaw, and is continued with the membranous fold that passes from the soft palate to the tongue. After covering the inner alveolar plate of the lower jaw, it passes to the under surface and sides, and then to the upper part of the tongue. Opposite to the symphysis of the bone, and just over the attachment of the geniogloss, it makes a fold, called the frænum, which limits the motions of the tongue. In other situations the membrane is produced loosely from the bone to the tongue; and it covers on each side towards the front a small oblong eminence, formed by the projection of the sublingual salivary gland. From the back of the tongue the membrane is extended over the epiglottis, and forms three folds, connecting that organ to the surrounding parts.

The moveable and nearly hemispherical covering, consisting of common integuments on the outside, of a soft vascular membrane internally, and having a considerable number of muscles, together with more or less fat, and numerous glandular bodies interposed between these;—extended from the cheek-bone, upper jaw, and front of the nose, so as to cover the two rows of the teeth, and attached below to the whole length of the alveolar portion of the lower jaw; and possessing a middle transverse fissure, parallel to the teeth, and corresponding to the interval of the two rows, but much shorter than that interval;—constitutes the *lips* and *cheeks*.

The *lips* are the two moveable portions of the above-described production, placed before the front teeth, bounding the mouth at its anterior part, and forming, by their red and softly-swelling edges, the margins of the opening of the mouth. The *upper lip* includes the part placed between that opening and the nose: the *lower* is the portion between the same orifice and the lower jaw. These organs are very important, from the influence which they exert on the general expression of the countenance, not to mention their share in articulation, mastication, &c. They are united at the two corners of the mouth by acute angles, named their commissures. These are entirely muscular; so that they admit of considerable extension and retraction. Their loose edge, which is their thickest part, and is marked by several lines crossing between the two margins, is the point of continuity between the mucous membrane of the mouth, and the common integuments.

The external stratum of the lips consists of skin remarkable for its thinness, as well as for the hairs which grow in it, and form the beard, one of the great characteristic differences between the male and female subject. This is succeeded by a layer of muscular fibres, united to the former by a close cellular texture, in which there is very little fat. This layer is composed principally of the orbicularis oris; to which are added the elevators of the upper lip, and of the corner of the mouth above, the buccinator zygomaticus and depressor anguli oris at the commissure, and the depressors of the lower lip below. The muscular layer is followed by a considerable number of large, rounded, mucous glands *(glandulæ labiales)*, arranged in an uniform stratum, covered towards the mouth by the mucus membrane, in which they often cause conspicuous prominences, and possessing excretory ducts, which perforate that membrane. The mucous lining of the lip resembles that of the mouth in general: it is very vascular, and becomes of a general and deep red from minute injections; its surface is moistened by the mucous secretion of the glandulæ labiales. The red swelling part, which forms the very opening of the mouth, is distinguished from the common skin, externally, by a clearly defined line, and from the mucous membrane on the inside. It is this part which forms, by its clear transparent redness, so beautiful a contrast with the pearly whiteness of the teeth. It possesses cuticles, which often separate in dry and ragged portions, particularly in cold weather. The cutis at this part is furnished with numerous villi, indicating a high degree of organization; and the pleasurable physical sensation, experienced in kissing, corresponds with this structure. The entire want of fat, or the very small quantity which does exist in the lips, occasions these parts to retain almost constantly the same thickness: which is not more favourable

to

to their functions than if they had changed according to the embonpoint, or thinnefs of the body in general.

The external opening of the mouth is the fpace left between the two lips. Its direction in the quiefcent ftate is tranfverfe; and it does not then exift as an opening, fince the two lips are in contact. The free power of motion, which the fides of the aperture poffefs in every direction, renders it fufceptible of very numerous varieties, both of fize and figure. In the moft contracted ftate, it forms a fmall tranfverfe groove with corrugated edges. It may be extended laterally by the feparation of both corners, until thofe parts are brought oppofite to the laft bicufpis, or firft molar tooth. In the perpendicular direction, it is affected chiefly by the depreffion of the lower jaw; but it may alfo be changed by the motions of the lips merely, which can be feparated to a confiderable diftance, their edges being at the fame time turned out, and a larger furface of the red part being expofed.

The *cheeks*, forming the lateral boundaries of the mouth, are parts of fimilar organization to the lips, with which, indeed, they are entirely continuous, fo that there is no natural diftinction between them. Externally, their extent is not defined by any precife limits; but thofe ufually affigned are the cheek-bone above, the bafe of the lower jaw below, the commiffure of the lips in front, and the projection of the maffeter behind. Towards the mouth on the contrary, they are bounded precifely, both above and below, by the reflexions of the mucous membrane from their furface to the jaw-bones; behind by the folds of membrane defcending from the velum palati, and in front by the commiffure of the lips. Their thicknefs depends on the quantity of fat which they contain, which is fubject to confiderable variety. The external ftratum of the cheek confifts of a thin and delicately organized fkin, from which there are but few hairs growing, particularly towards the middle. In this part it is particularly diftinguifhed by its capillary fyftem, through which a large quantity of blood is conftantly circulating in young and healthy perfons. This being liable to fudden and accidental changes, either of increafe or diminution, becomes an involuntary index of the affections of the mind; whether, as in the pleafurable motions, and likewife in anger, indignation, its momentary diftenfion gives rife to that vivid rednefs of the cheek, which extends, in a diminifhed degree, to other parts of the face; or, as in the depreffing and forrowful paffions, the fame parts become overfpread with a more or lefs fudden palenefs. The capillary fyftem of the cheeks is alfo varioufly affected in difeafe, where it is fometimes emptied of its blood, and in other cafes diftended with an unufual quantity. It alfo admits coloured injections very readily in the dead fubject. Under the integuments of the cheek, we have the zygomaticus mufcle, covering a confiderable quantity of foft fat, contained in a loofe cellular texture. This facilitates the motions of the buccinator and neighbouring mufcles, and augments confiderably the tranfverfe diameter of the face. It is abforbed very rapidly in various difeafes, and foon replaced in a ftate of convalefcence; fo that the figure of the cheeks becomes an index of the general health. Under this fat the whole furface of the cheek is covered by the buccinator mufcle; which is lined *internally by the mucous membrane of the mouth*, feveral round mucous glands (*glandulæ buccales*) being interpofed between it and the mufcle.

Mufcles of the Lips and Cheeks.

Nafalis labii fuperioris.—This, which is defcribed by Albinus as a diftinct mufcle, is undoubtedly a part of the orbicularis. It arifes in a pointed form from the tip of the nofe, and from the feptum narium, and, growing thicker as it defcends, turns outwards, and terminates in the orbicularis. It will approximate the corners of the mouth, and deprefs the apex and feptum of the nofe. It will alfo elevate and turn outwards the upper lip, fo as to apply it againft the openings of the noftrils.

Levator labii fuperioris et alæ nafi, (pyramidal and lateral dunez).—This is very commonly defcribed as forming two feparate mufcles, a proper elevator of the upper lip, and a common elevator of it and the ala nafi: we do not confider the diftinction fufficiently marked, and therefore defcribe them together. It arifes in a pointed manner, from the nafal procefs of the upper jaw, where it is confufed with the frontal mufcle; it defcends along the fide of the nofe from this origin, and has a fecond very broad attachment, divifible into two or more portions, to the fuperior maxillary bone, along the front edge of the orbit, and above the infra-orbitar foramen. This fecond portion of its fibres paffes obliquely downwards and inwards to join the former; and on its outer edge it is fometimes continued by irregular fibres to the zygomaticus. Its infertions are, 1ft, into the alæ nafi, where it is united with the compreffor narium, and depreffor alæ nafi; 2dly, into the upper lip, as far as the corner of the mouth, by an union of its fibres with thofe of the orbicularis oris, and levator anguli.

It is covered on the nofe partly by the integuments, and by the orbicularis palpebrarum and facial vein; lower down by the two former parts. It covers the os nafi, the nafal procefs of the fuperior maxillary bone, the depreffor alæ nafi, levator anguli oris, and infra-orbitar veffels and nerves. It elevates the upper lip, and the alæ of the nofe; and as both thefe effects are produced by the fame mufcle, it is difficult to raife the lip without, at the fame time, moving the nofe. Its action caufes a fwelling of the integuments between the lip and the eye. As it is attached towards the front of the lip, it turns that part outwards and upwards: and, in confequence of the oblique courfe of a great part of its fibres, it extends the lip horizontally at the fame time that it produces the elevation. It acts in the fmile of derifion, and is exerted in all the angry and fcornful affections of the mind.

Zygomaticus major, or diftortor anguli oris.—This is a rather elongated and flender mufcle, produced in an oblique direction from the convexity of the os malæ to the corner of the mouth, and terminating by a continuation of its fibres with thofe of the orbicularis and other mufcles of the lips. It is covered externally by the fkin of the cheek, and it lies upon the os malæ, the facial vein, and the buccinator mufcle. It draws the corner of the mouth towards the temple, and thereby caufes a fwelling of the cheek. The right and left mufcles acting together enlarge the mouth horizontally, and draw the corners upwards, as in laughing. There is fometimes, but not conftantly, a *zygomaticus minor*, placed in front of the preceding mufcle, and confifting of a thin fafciculus of fibres, which have a fimilar origin, direction, infertion, and ufe, as the greater zygomaticus.

Levator anguli oris, or *labiorum communis* (le canin).—It has a thin and flat origin from the hollow of the upper jawbone, juft under the infra-orbitar foramen. Its fibres pafs obliquely downwards and outwards to the corner of the mouth, where it mingles with thofe of the orbicularis and depreffor anguli. On its anterior furface lie the levator labii fup. et alæ nafi, with the infra-orbitar veffels and nerves. Behind it are placed the furface of the jaw-bone, the membrane of the cheek, and the buccinator. It elevates the corner of the mouth, and thereby reftores the parts which have been depreffed in the forrowful emotions.

Depreffor

Depreſſor anguli oris (triangularis), is a muſcle of a flattened and triangular figure, extended from the ſide of the chin to the corner of the mouth. It has a broad origin from the anterior part of the baſis of the lower jaw, grows narrower as it aſcends, has its fibres ſlightly arched towards the chin, and terminates at the corner of the mouth by uniting with the zygomaticus, levator anguli, and orbicularis. Its outer edge is a point of inſertion to numerous fibres of the platyſma myoides. Covered by the ſkin externally, it lies upon the depreſſor labii inferioris, and buccinator. It depreſſes the corner of the mouth, and is a very important muſcle, in a phyſiognomical point of view, as it acts in all the ſorrowful emotions. Its effects can be well ſeen in crying.

Depreſſor labii inferioris proprius (quadratus.)—It ariſes from about one inch of the anterior and lateral part of the jaw, covered at its origin by the former muſcle. Its fibres paſs obliquely upwards and inwards, and mingle with thoſe of the oppoſite muſcle. It terminates by a broad inſertion into the lower lip, confounding its fibres with thoſe of the orbicularis. The preceding muſcle, the levator menti, and the latiſſimus colli are alſo connected with it; and there is much fat mixed with its fibres. The depreſſor anguli and ſkin (to which it is ſtrongly united) cover this muſcle externally; and it covers on the other ſide the levator menti, the mental veſſels and nerves, and the orbicularis. It draws the lower lip down to the chin.

Levator menti (elevator proprius lab. infer.; inciſif inferieur).—This ariſes from the lower jaw-bone, about the ſocket of the cuſpidatus, by firm fleſhy fibres, which deſcend inwards, and join thoſe of the oppoſite ſide, being ſtrongly united with thoſe of the depreſſor lab. infer. It terminates in the cellular ſubſtance and ſkin of the projecting part of the chin. It elevates and corrugates the chin; it reſtores the lower lip, when that has been depreſſed. By drawing up the chin, it will evert the lower lip, as we ſee occaſionally in ſcorn and deriſion.

The *buccinator* is the largeſt muſcle of the lips. It is thin, but very broad; flattened on its ſurfaces, nearly quadrilateral, occupying the ſpace between the two jaws, and ſpread immediately over the membrane of the cheek. It ariſes from the tubercle of the upper jaw, from the pterygoid proceſs, ſide of the pharynx, and ſpace between the laſt grinder, and coronoid proceſs of the lower jaw. Its fibres purſue a tranſverſe courſe to the lips, and are parallel to each other. They terminate under the elevator and depreſſor muſcles juſt deſcribed, by uniting their fibres with thoſe of the orbicularis oris. It is perforated by the duct of the parotid gland. The buccinator muſcle is ſeparated from the coronoid proceſs, and maſſeter, which lie over it behind, and from the zygomaticus major, facial artery and vein, and latiſſimus colli, which cover it towards the front, by a conſiderable quantity of fat. Its inner ſurface covers the mucous membrane of the mouth. It draws the whole of the mouth backwards, and thereby corrugates the cheek. It admits of mechanical diſtenſion by air or food contained in the mouth, and acts on thoſe in various ways. It expels the air in perſons who are blowing wind inſtruments; it puſhes the food under the teeth in maſtication, or towards the back of the tongue previouſly to deglutition.

Orbicularis oris (le labial; ſemiorbiculaire ſuperieur and inferieur).—This muſcle, which ſurrounds the opening of the mouth, conſiſts of concentric fibres forming an elongated oval, with its long axis placed horizontally. It is flattened on its anterior ſurface. The fibres compoſing it may be divided into the common and the proper. The firſt of theſe conſtitute the exterior portion of the muſcles, and conſiſt of the union and intermixture of the various muſcles belonging to the lips: *viz.* the levator labii ſuperioris et alæ naſi, zygomaticus minor, and naſalis labii ſuperioris above; the depreſſor labii inferioris and levator menti below; and the zygomaticus major, levator anguli oris, buccinator and depreſſor anguli oris at the commiſſure. Theſe are all ſo mingled together, that we cannot deſcribe any particular courſe of fibres in that portion of the orbicularis which is formed by their union. The proper fibres of the orbicularis are placed within the former, being continuous with them, and correſponding to the looſe edge of lips. This muſcle is cloſely covered by the ſkin externally, by the red part of the lips on its inner circumference, and by the glandulæ labiales and mucous membrane towards the mouth. The orbicularis oris is the antagoniſt of all the other muſcles that move the lips, and reſtores theſe parts, when they have been moved out of their natural ſituation in any direction. It brings them into contact with each other in an horizontal line, ſo as to cloſe the mouth. When it is neceſſary to contract the mouth beyond this degree, as in blowing ſeveral wind inſtruments, the orbicularis is employed, and cauſes a corrugated ſtate of the lips. It brings theſe parts in cloſe contact with any body round which they may be applied in the act of ſuction. The action of their exterior fibres tends to evert the edges of the lips, ſo as to bring the red part more completely into view.

There are ſometimes connected with the muſcles above deſcribed ſome irregular fibres, which do not exiſt conſtantly. There is frequently a portion of muſcles croſſing tranſverſely between the right and left platyſma, juſt at the chin; the *tranſverſus menti* of Santorini. Some fibres ariſing in the cellular ſubſtance over the maſſeter, or from the platyſma myoides, and paſſing to the corner of the mouth, have been deſcribed under the name of *riſorius*. Soemmerring has deſcribed by the epithet of *anomalus maxillæ ſuperioris*, ſome irregular fibres, ſituated under the levator of the upper lip, and inſerted by both extremities into the upper jaw-bone.

The palate, compoſing the upper ſurface of the mouth, is nearly of a parabolic figure, extending rather more in length than in breadth. Its poſition is nearly horizontal in the ordinary erect attitude; and as its bony ſtructure renders it completely motionleſs of itſelf, it offers a fixed point of reſiſtance to the tongue in the motions of articulation and deglutition. It conſiſts of a vaulted bony ſurface, covered by a thick and compact membrane. We muſt diſtinguiſh in the bone the alveolar portion, and the proper palatine arch. The former conſtitutes a parabolical projection, which limits the palate at its anterior and lateral aſpects, and contains on its inferior ſurface the openings of the alveoli. This belongs entirely to the ſuperior maxillary bones, and ſurmounts the upper row of teeth which borders the palate. The proper palatine arch is made up of the horizontal portions of the ſuperior maxillary and palatine bones.

The palate, when conſidered in its perfect ſtate, preſents a very conſiderable concavity towards the mouth. In the child, which has not yet cut its teeth, and where conſequently the alveolar proceſs is not yet formed; and in the old ſubject, where theſe organs, together with the bone in which they were implanted, have been loſt, this part of the mouth preſents a very different appearance from that which it has in the intervening periods. It exhibits a nearly level ſurface, inſtead of a conſiderable concavity. The lower jaw-bone undergoes a ſimilar change in advanced age; hence the cavity that holds the tongue becomes very conſiderably diminiſhed, and the motions of that organ in articulation and chewing are proportionally impaired.

The membrane of the palate preſents a very different arrangement

rangement on the alveolar and palatine portions of the bone. In the former fituation, it conftitutes in the fœtus a thick, denfe, firm, and whitifh layer, covering the alveoli and rudiments of the teeth, and forming a refifting furface capable of the efforts required in that fpecies of maftication which is then exercifed. This is pierced by the teeth when they appear in the mouth; and its fides, adhering round the neck of the tooth, conftitute the gum. When the teeth and alveoli are loft, the perforations of the gum are deftroyed by the clofing of their fides, and a fimilar hard white fubftance to that of the fœtus again occupies the alveolar edges of the jaws, and affords confiderable affiftance in old age in the act of maftication.

The membrane covering the palate is thick, and clofe in its texture. It is divided by a middle line into two halves, more perceptibly in the fœtus than in the adult. Its furface is irregular, and marked towards the front by tranfverfe lines: between it and the bone are feveral mucous glands, *(glandulæ palatinæ,)* with excretory ducts, opening confpicuoufly on the furface, which become more numerous towards the velum palati, with the anterior furface of which the palatine membrane is continuous.

The pofterior boundary of the mouth is formed by a flefhy and moveable curtain, extended from the back of the palatine arch into the pharynx, and called the *foft palate*, or *velum palati*. Thus it is placed above the opening, which leads from the mouth into the pharynx, and is feparated by that aperture from the bafe of the tongue. Its figure is nearly quadrangular; and it poffeffes two furfaces, of which one is anterior, and the other pofterior; and four margins, of which two are lateral, one fuperior, and the other inferior. The anterior furface, which is turned towards the tongue, and faces downwards and forwards, is fmooth and uniform, and gently concave, prefenting feveral fmall openings of the mucous ducts; the pofterior, which is directed upwards and backwards, has a confiderable elevation on each fide, arifing from the courfe of the levator palati mufcle, and a fmaller one in the middle from the azygus uvulæ. The fuperior margin is fixed to the back edge of the palatine bones, and this is the thickeft part of the velum. The inferior border hangs loofely into the pharynx, and is divided into two parts by a conically fhaped body, projecting exactly from the middle of the velum, and named the *uvula*. The broader part of this organ is rather flattened, and is placed upwards; the fmaller portion is more cylindrical in its figure, and is directed downwards, terminating in an obtufe extremity. It varies in length in different individuals, and in the fame perfon, according to the ftate of its elevator mufcle. It fometimes hangs down fo as to touch the tongue; and when it is thus permanently relaxed, it caufes a very difagreeable irritation. In its natural ftate it points nearly to the foramen cæcum of the tongue, and is therefore confiderably in front of the epiglottis. It is peculiar to the human fubject, and to animals of the monkey kind; in other inftances, the lower edge of the foft palate is nearly ftraight. The prefence of the uvula caufes the correfponding part in man to form a double arch.

The lateral edges of the foft palate are continued with the tongue and pharynx by two membranous and mufcular folds. Thefe are united at their origin, which takes place at the outer corner of the lower edge of the palate; but they feparate from each other as they defcend. The anterior *(gloffo-palatine)* terminates on the fide of the bafe of the tongue; the pofterior *(pharyngo-palatine)* is loft on the fide of the pharynx. A triangular fpace, formed by their feparation, contains the tonfil.

The contracted opening, by which the mouth communicates with the pharynx *(ifthmus faucium)* is chiefly formed by the parts now defcribed. If we take a front view of it, as when we look into the throat of a living perfon, we find it bounded below by the root of the tongue; above by the lower edge of the foft palate, divided into two arches by the uvula; and at the fides by the gloffo-palatine folds of membrane continued from the palate to the tongue. Juft behind thefe the convex furface of the tonfils is difcernible. In the back view of the fame aperture, from the bag of the pharynx, we fee, as from the front, the tongue below, and the double arch of the palate with the uvula above. But the fides are here formed by the pharyngo-palatine folds, produced from the velum in a perpendicular direction to the fides of the pharynx. The convexity of the tonfil is confpicuous alfo in this view.

The foft palate has two membranous furfaces, of which the anterior is continuous with that of the palate, and the pofterior with the pituitary membrane. Thefe are continued into each other at the loofe edge of the curtain. The palatine portion of the membrane covers a thick layer of granular bodies, which pour out a copious mucous fecretion from numerous pores eafily diftinguifhable by the naked eye. The uvula contains a confiderable mafs of fimilar glands. The mufcles of the palate contribute alfo to its fubftance. The azygus uvulæ occupies the centre, and the levator and circumflexus palati are expanded in the lateral portions of the velum. The folds produced from the palate to the tongue and pharynx contain alfo mufcular fibres.

The remarks which we have to make refpecting the motions of the foft palate, and the effect which thefe produce on the ifthmus faucium, will be given in the defcription of the pharynx.

Mufcles of the Palate. Levator palati mollis (falpingo-ftaphylinus; periftaphylinus internus).—This mufcle confifts of a confiderable collection of fibres; it is rounded above, and flattened below, and fituated at the fide of the pofterior opening of the nofe. Arifing from the under furface of the petrous portion of the temporal bone, in front of the carotid canal, and from the cartilage of the Euftachian tube, it paffes obliquely downwards and inwards, and expands in the middle of the foft palate. The circumflexus palati and fuperior conftrictor of the pharynx cover it externally, and the membrane of the pharynx on the infide. It will draw the foft palate upwards, and apply it againft the pofterior openings of the nofe.

Circumflexus palati (fpheno-falpingo-ftaphylinus; periftaphylinus externus).—This mufcle is flattened and elongated in its figure, and lies along the pterygoid procefs of the fphenoid bone. It arifes from the cartilage of the Euftachian tube, and from a fuperficial foffa of the internal pterygoid plate, to which it is attached as far as the commencement of the hook-like procefs. It then forms an aponeurofis, which turns round the hook, being furnifhed with a burfa mucofa; turns horizontally inwards, and expands in the middle of the palate, uniting with the mufcle of the oppofite fide. It is fituated between the external pterygoid mufcle and the internal pterygoid plate, and fuperior conftrictor of the pharynx.

Its action will be the fame as if it had arifen from the pterygoid hamulus. It will draw down the velum from the nofe, and will expand it laterally.

Azygus uvulæ (palato-ftaphylinus; ftaphylinus; epiftaphylinus).—It is a fmall mufcle, fometimes double, of an elongated form, arifing from the pointed projection at the back edge of the os palati, and running along the middle of the velum and uvula, in which latter it terminates. It is covered on its pofterior furface by the membrane of the palate, and in

in front by the expanded infertion of the levator palati. It elevates the uvula, and fhortens it; when we look into the throat of a living perfon, its action may be feen in the motions of the uvula.

Palato-pharyngeus (pharyngo-palatinus; pharyngo-ftaphylinus).—The membranous folds continued from the foft palate to the tongue and pharynx contain mufcular fibres, and the pofterior ones are defcribed under the above names. It has a broad origin in the fubftance of the palate from the aponeurotic expanfion arifing from the union of the tendons of the circumflexi; paffes firft outwards, and then turns in an arched courfe downwards and backwards, confifting of a thin ftratum of mufcular fibres. Here it follows the courfe of the pharyngo-palatine fold, the membrane of which covers it towards the pharynx. It expands into the fide of the bag, and has its fibres mixed with the middle conftrictor and ftylopharyngeus, and flightly connected to the thyroid cartilage. In the palate it is fituated in front of the levator palati; and below, between the membrane of the pharyngo-palatine fold, and the conftrictores pharyngis. As both its infertions are moveable, it may influence them both by its contraction. The fuperior muft be confidered as the moft capable of motion; it will therefore deprefs the foft palate, carry it away from the nofe, and bring it againft the root of the tongue. It may, at the fame time, contribute to elevate and dilate the pharynx. If the larynx were held in its depreffed ftate, it would act merely on the palate, and would bring that part in contact with the tongue; as, on the contrary, if the palate were fixed by its elevating powers, it would draw up the pharynx.

Palato-gloffus (gloffo-palatinus; gloffo-ftaphylinus; conftrictor ifthmi faucium).—This is the mufcle fituated in the anterior or gloffo-palatine fold of membrane, and it poffeffes an arched form like the preceding one. It defcends from the palate along the anterior part and fide of the ifthmus faucium, confifting of a few but eafily difcernible fibres, covered only by the thin membrane. It is attached to the root of the tongue. The effect of its action is very fimilar to that of the former, the approximation of the palate to the root of the tongue.

The *tonfils* are glandular bodies occupying the fpace left between the gloffo-palatine, and pharyngo-palatine folds of membrane, extending above to the point at which thefe folds are united, and below to the bafe of the tongue. The palato-gloffus mufcle lies in front of the gland, and the palato-pharyngeus behind. The two mufcles juft mentioned prefs the tonfils between them in the act of deglutition, and fqueeze out the fecreted fluid from their excretory ducts. When they are inflamed, as in the various affections of thefe parts denominated fore throat, &c. this preffure gives rife to the difficulty and pain experienced at that time in the act of fwallowing. The form of the tonfil, which is fubject to much variety, approaches moft nearly to the oval figure, with the long axis placed perpendicularly; and the fize is tolerably well expreffed by the common comparifon to an almond, from which the name of *amygdalæ* has been given to thefe glands. They are often divided into lobes more or lefs diftinct from each other. Their colour is rather grey, and their texture foft. The convex portion of the glands, which projects between the two folds of membrane, has feveral openings on its furface, leading into fmall cells hollowed out in the fubftance of the tonfil, and lined by continuations of the membrane of the mouth. The mucus fecreted by the veffels of the part is depofited in thefe cells by the excretory tubes, from which it may be preffed out in the dead fubject. This fluid, which is tranfparent in the healthy ftate, becomes white and opaque in certain inflammatory affections, and then lodging in the fuperficial cells, gives the deceptive appearance of a fmall ulcer or flough in the part.

Smaller glandular maffes of a fimilar ftructure and office exift, as we have already mentioned, in confiderable numbers, in the fubftance of the velum palati and uvula. The back of the tongue is furnifhed likewife with feveral fmall roundifh flattened prominences, which give it an irregular and tuberculated appearance in this fituation; there are alfo mucous glands, called *linguales;* and they difcharge their fluids by an opening which is confpicuous in the centre of each tubercle. The ufe of this mucous apparatus, exifting in fuch abundance in every part of the ifthmus or contracted aperture, which forms the communication between the mouth and pharynx, feems very obvious; that of furnifhing a lubricating fluid, to facilitate the paffage of the food, particularly when it is of a dry nature.

The *tongue* conftitutes the organ of tafte; but it is by no means confined to that office; we confider it here as forming a part of the mouth, and as concurring by its motions in the proceffes of maftication and deglutition. It is alfo moft immediately and effentially concerned in the production of articulated founds. Befides the offices now enumerated, it performs a moft important part in the earlier periods of our exiftence, as an indifpenfible agent in the act of fuction; as the means therefore by which we derive our firft nourifhment.

Two parts are to be confidered in treating of this organ: the bone fituated under it, and affording it a firm fupport, as well as a point of origin for the various mufcles which move it; and the foft mufcular body forming the tongue properly fo called.

The *os hyoides*, or *linguale*, is fituated between the bafe of the tongue and the larynx: the former part is clofely connected with it above, and the latter is no lefs firmly attached below. It receives the infertions of the mufcles of both thefe organs, and therefore is a part of the firft importance in the fubject of the prefent article.

It has received the name of hyoides from its refemblance to the Greek υ, to which indeed it may be very well compared. It is placed in the neck, with its convexity forwards, and the two extremities backwards; and is divided into a bafis, which is the middle part, and two cornua, which form the fides. Thefe are joined together by fynchondrofes. The *bafis*, which is the thickeft portion, is rather flattened in its form, and prefents an oblique furface to the front, marked with a more or lefs regular crucial projection, and giving attachment to the following mufcles in a feries from before backwards; *viz.* digaftrici, ftylo-hyoidei, mylo-hyoidei, genio-hyoidei, and hyagloffi. Behind it is rather concave, and gives attachment to a membranous ligament tying it to the thyroid cartilage. The fuperior margin has the hyogloffus fixed to it, and the inferior receives the infertions of the fterno-hyoidei, omo-hyoidei, and thyro-hyoidei. It terminates at each end by a fmooth furface, united to a correfponding one of the cornu, by means of cartilage; and the two parts are feldom anchylofed together. The two *cornua* are much longer and thinner than the bafe, and are alfo flattened in their form. They are broader before than behind, and flightly bent inwards towards each other. The hyo-gloffus and middle conftrictor of the pharynx are inferted into them above; the thyro-hyoideal membrane and a part of the thyro-hyoideus below. Internally they are covered by the membrane of the pharynx. The anterior and broadeft extremities of the cornua are furmounted by two fmall bits of bone, named the *cornicula* of the os hyoides. Their fize and figure are very much like thofe of a grain of wheat, and their pofition is inclined; one extremity pointing

 downwards

downwards and forwards, the other upwards and backwards. By the former of thefe it is united to the fynchondrofis, which connects the bafis and cornu of the os hyoides, but is moveable in its fituation. Some fibres of the hyogloffus are fixed to it; and its upper extremity receives the infertion of the ftylo-hyoideal ligament. The pofterior extremity of the cornu of the os hyoides terminates in a fomewhat rounded tubercle, to which the hyo-thyroideal ligament is fixed. The bafis of this bone contains much of the cancellous texture; but that is lefs abundant in the cornua. Its offification commences by five points; one for the bafis, one for each of the cornua, and one for each corniculum. Thefe bony pieces are feparated at firft by much cartilage, which is gradually offified, except at the points of junction, where a lamina of cartilage remains through life.

Independently of the numerous mufcles which fix the os hyoides in its place, it is attached by various ligamentous connexions. Below, the thyro-hyoideal membrane and ligaments tye it to the larynx in fuch a way that this part follows all its motions. Thus being interpofed between the larynx and tongue, it is a common centre neceffary to the motions of both thofe parts. Properly fpeaking, it has no functions of its own; its motions are not relative to itfelf, but are defigned merely to produce motion of the tongue or larynx. It is only connected to the tongue by means of mufcular fibres; but it is fixed to the bafis cranii by a ligament which we proceed to defcribe.

The *ftylo hyoideal ligament* arifes from the ftyloid procefs of the temporal bone, defcends obliquely forwards and inwards, and is fixed to the leffer cornua of the os hyoides. It is of different thicknefs in different individuals; and often contains fmall granulated portions of cartilage or bone. Indeed it is fometimes converted into bone in almoft its whole extent, and it appears then as a continuation of the ftyloid procefs. It prevents the depreffion of the larynx from proceeding beyond a certain point. That cavity cannot defcend without carrying with it the os hyoides, which is not at all reftrained by the tongue, fince that alfo is moveable.

Mufcles moving the os hyoides.—The digaftricus or biventer maxillæ, which we have already defcribed, muft be enumerated with thefe; fee its defcription in a preceding part of the article.

Tranfverfus mandibulæ (mylohyoideus).—This is a very broad and rather thin mufcle; flattened on its furfaces, and extending tranfverfely acrofs the fpace left between the two fides of the lower jaw-bone. It has a tendinous origin, from an oblique ridge of the inner furface of the jaw, which commences juft under the laft molar tooth, and then extends obliquely downwards and forwards to the fymphyfis. Its fibres are continued to the fame point on the oppofite fide in an arched direction, the mufcle being concave on its fuperior, and convex on its inferior afpect.

In the middle of the mufcle, in a ftraight line from the fymphyfis of the jaw to the bafe of the os hyoides, there is a portion of tendon, broader towards the lower part, and then growing gradually narrower. All the fibres, derived from the lateral portions of the jaw-bone on either fide, form right angles with this middle line. It muft be immediately obvious, from the preceding defcription, that the fibres of the mufcle differ much in length; the pofterior ones are the longeft, and are inferted into the upper edge of the bafe of the os hyoides, juft behind the digaftricus; the fucceeding fibres become progreffively fhorter and fhorter to the anterior edge of the mufcle, where their length is very infignificant. The external furface of this mufcle is in contact on either fide with the anterior portion of the digaftricus, with the fubmaxillary gland and latiffimus colli. Internally it covers the genio-hyoideus, genio-gloffus, hyogloffus, fublingual gland, Whartonian duct, and nerve of the ninth pair.

It elevates the os hyoides, and at the fame time raifes all the parts in front of that bone, which are contained in the concavity of its fibres. Hence it muft prefs the tongue againft the palate, and comprefs the fublingual glands. When the os hyoides is fixed, it may deprefs the lower jaw.

Genio-hyoideus.—This mufcle, which is placed immediately behind the middle tendinous line of the tranfverfus mandibulæ, is of a rounded form, and extends from the inferior tubercle of the inner furface of the chin, obliquely downwards and backwards, to the middle of the bafis of the os hyoides. It lies very clofe to its fellow of the oppofite fide, to which it is connected by fine and fhort cellular threads, fo that on a fuperficial infpection they would appear to form one mufcle. It is covered on its anterior and inferior afpect by the tranfverfus mandibulæ, and lies in contact, by its oppofite or pofterior fuperior edge, with the genio-gloffus.

It elevates and carries forwards the os hyoides; and of courfe it draws up the larynx at the fame time. It affifts in protruding the tongue from the mouth. When the os hyoides is fixed by the powers that deprefs it, it will draw down the lower jaw.

Stylo-hyoideus.—This is a flender elongated mufcle, having a tendinous origin from the ftyloid procefs, defcending obliquely forwards and inwards, rather increafing in breadth as it defcends, and inferted into the bafis or the front end of the cornu of the os hyoides. It is generally, but not always, furnifhed with a flit, through which the tendon of the digaftricus paffes. It is covered externally by the digaftric, and on the infide has the fame relations as that mufcle. It draws the os hyoides upwards and backwards and towards its own fide; and therefore contributes to reftore the tongue when it has been protruded from the mouth; both mufcles acting together, muft elevate it nearly in a ftraight direction. If it is employed in concert with the genio-hyoideus and tranfverfus mandibulæ, the larynx will be elevated directly, as the oppofition of the powers tending to carry it forwards and backwards prevents it from moving in either of thefe ways.

Omo-hyoideus (coraco-hyoideus, cofto-hyoideus, omoplato-hyoideus).—It arifes by tendon from the fuperior cofta of the fcapula, juft behind the notch at the root of the coracoid procefs, and fometimes from the ligament ftretched over that notch. Forming a thin, flat, and narrow mufcle, it afcends along the neck obliquely forwards and inwards, connected, as it paffes behind the clavicle, to the back of that bone, by an aponeurofis. It goes between the fterno-cleido-maftoideus, and the veffels of the neck, and is contracted at that part into a thin and narrow tendon. Afterwards it affumes again the fame flefhy form which it poffeffed before, and emerging from under the fterno-cleido-maftoideus, afcends more directly in the front of the neck, and contracting in its breadth is inferted tendinous into the lower margin of the bafis of the os hyoides. It is the longeft and thinneft of the mufcles of the neck. It poffeffes in the embryo a nearly equal breadth throughout, without any middle tendinous portion. It is covered by the latiffimus colli, fterno-cleido-maftoideus, clavicle, and trapezius; and lies upon the fcaleni, the cervical nerves, carotid artery, and internal jugular vein, fuperior thyroideal veffels, and hyothyroideus mufcle. The fterno-hyoideus lies along the front edge of its upper portion. It fometimes arifes from the clavicle. It will draw the os hyoides obliquely backwards and downwards towards its own fide; or directly downwards, if it acts

acts in conjunction with the oppofite mufcle. By depreffing the os hyoides, and fixing it in its depreffed fituation, it will affift, as well as the three fucceeding mufcles, in carrying down the lower jaw. For the os hyoides is then a fixed point, from which the mufcles extending from its upper part to the jaw may act.

Sterno-hyoideus.—This is a broad, thin, and flat mufcle, fituated on the front of the neck, juft under the platyfma myoides, and extending from the top of the cheft to the front of the larynx. It has a broad tendinous origin from the outer part of the pofterior furface of the firft bone of the fternum, from the contiguous cartilage of the firft rib, from the joint of the clavicle and fternum, and from the clavicle itfelf. It grows rather narrower as it afcends, covers the furface of the trachea, and approximates to the mufcle of the oppofite fide. The two together completely cover the front of the larynx, and are inferted into the middle of the lower edge of the bafis of the os hyoides, in the fpace left between the attachments of the two omo-hyoidei. It is covered by the platyfma myoides, and fterno-cleido-maftoideus; and lies upon the fterno-thyroideus, hyo-thyroideus, crico-thyroideus, thyroid gland, and fuperior thyroid veffels. It draws down the os hyoides and parts connected to it, as the tongue, larynx, lower jaw, &c. It may even, through the connexions of the os hyoides, bend the head forwards.

The *fterno-thyroideus* is a mufcle of fimilar fhape and fituation to the former, behind which it lies. Its origin is by a broad tendon from the pofterior furface of the firft bone of the fternum, from which part it afcends in front of the trachea, and thyroid gland, and is foon marked by a tranfverfe tendinous line. Its edge at firft touches that of the oppofite mufcle in front of the trachea; it grows narrower as it paffes upwards, and at the fame time feparates from the other: it terminates by a tendinous infertion into the oblique ridge of the ala of the thyroid cartilage. Its furface is every where covered by the fterno-hyoideus; and it lies upon the fubclavian, and internal jugular veins, the carotid artery, the trachea, the thyroid gland and its veffels, and the crico-thyroideus. It depreffes the thyroid cartilage, and at the fame time the whole larynx, os hyoides, and parts connected with it. It concurs therefore in producing the fame effect with the preceding mufcles, for which reafon we defcribe it here, although it is not attached to the os hyoides.

The *hyo-thyroideus* is a mufcle of a flattened form, arifing from the oblique ridge of the thyroid ala, and afcending in a ftraight direction to the under edge of the cornua of the os hyoides, in which it is inferted. It is covered by the fterno-hyoideus, and omo-hyoideus externally, and it lies on the thyroid cartilage. It will mutually approximate the os hyoides and larynx; elevating the latter, or depreffing the former, according as the fixed and moveable points may be changed. It is obvious that the mufcles, which we have juft defcribed, muft be regarded in reference to the effects which they produce on parts connected to the os hyoides. The afcent and defcent of that bone cannot take place without correfponding motions of the larynx, and thefe are one of the means by which the tone of the voice is altered in fpeaking or finging. Again, the pharynx is fo intimately connected with the larynx, that it follows every motion of the latter; and its afcent and defcent in the neck, in the procefs of deglutition, are effected through the action of the hyoideal mufcles. We fee that the os linguale is a very moveable part; that its connexions in the neck leave it a free power of motion, and that it poffeffes numerous mufcles, capable of moving it in every direction.

The *tongue* occupies the lower part of the mouth; is bounded in front and at the fides by the teeth and alveolar portions of the two jaws, behind by the epiglottis, above by the palate, and below by the os hyoides and its mufcles. Its bulk and form are fubject to much variety, as it admits of elongation and retraction by the action of its various mufcles. It is fmaller in fize, and loofe towards the front; here it terminates by a rounded end, rather flattened on its upper and lower afpects, and named the apex. At the back part it becomes broader, thicker, and more convex, and is clofely attached below to the furrounding parts: this is called the bafis or root of the tongue. The fuperior furface, which is perfectly loofe and unconnected in its fituation, prefents a flight and general convexity, divided however by a fuperficial groove running along its middle from before backwards, into two equal halves. Thefe are loft towards the fides in the two edges of the tongue, which correfpond with the interval of the two rows of teeth, and like the fuperior furface are free from all kinds of attachment. The lateral portions of the organ, which are in contact with the inner furface of the lateral teeth, and the inner alveolar plate of the lower jaw, are flattened in their form, and are unconnected in their fituation. The inferior furface of the tongue cannot be very clearly defined, as we cannot exactly point out the boundaries between the tongue itfelf and its mufcles. It is connected below, throughout at leaft two thirds of its under furface, in the fpace left between the two lateral divifions of the lower jawbone, with feveral mufcles, arifing from the jaw, ftyloid procefs and os hyoides, and continued into the fubftance of the organ, which they have the power of moving in every direction, in the cavity of the mouth. It is the intermixture of thefe mufcles with the lingual nerves and veffels, and with a large mafs of a very peculiar mufcular fibre, called the lingualis mufcle, that forms the fubftance of the tongue. Towards the front of the organ the inferior furface is loofe and unconnected, except towards its middle, where it is tied by the frænum to the lower jaw at the pofterior furface of its fymphyfis. The back edge of the tongue is connected to the epiglottis by three folds of membrane.

The membrane of the mouth, after covering the inner alveolar plate of the lower jaw, is produced over the projecting portion of the fublingual gland, and then arrives at the inferior furface and fides of the tongue; from which it is continued to the upper convex part of the organ. In the former fituation it is fmooth like the lining of the cheeks; but in the latter it forms a moft rough furface, prefenting innumerable prominences named papillæ, and confidered to be the immediate organs of the fenfe of tafte; for a defcription of which, fee Tongue.

Mufcles of the Tongue.—The *ftyloglofus* is a flender elongated mufcle, having a very thin tendinous origin from the ftyloid procefs; it defcends growing gradually broader, and becomes connected to the pofterior and lateral part of the tongue, along the fide of which it runs as far as the very apex of the organ, mixed with the fibres of the hyo-gloffus. The parts in contact with it are the digaftricus, fubmaxillary gland, and nerve of the ninth pair externally; the fuperior conftrictor of the pharynx and the lingualis internally.

Hyo-gloffus, (bafio-gloffus, cerato-gloffus, and chondro-gloffus of Albinus).—This is a broad and thin mufcle, arifing extenfively from the os hyoides, to the bafis, cornu, and corniculum of which it is attached, afcending in a ftraight direction, and terminating in the fide of the tongue. The parts in contact with it are, externally, the digaftricus, ftylo-hyoideus, mylo-hyoideus, nerve of the ninth pair, and fublingual gland; internally, the lingual artery, gloffopharyngeal nerve, and genio-gloffus mufcle.

Genio-glossus.—This is a very large, strong, and broad muscle, flattened in its front, and passing from the posterior surface of the chin to the substance of the tongue. It has a small but strong tendinous origin from the highest of the eminences placed behind the anterior part of the lower jawbone. From this point its fibres extend in a radiated form; the lower ones pass obliquely downwards and backwards, and are inserted into the basis of the os hyoides; and the others are continued in various directions towards the superior surface of the tongue, according as they pass towards the basis, the middle, or the apex of the organ. Its fibres are most intimately blended with those of the lingualis, as well as with the hyo glossus. With the external surface of this muscle the following parts are in contact, *viz.* sublingual gland, hyo-glossus and stylo-glossus. The opposite muscle is connected by a fatty substance to its inner surface; and the genio-hyoideus lies along its lower and front edge.

The *lingualis* is usually described as a small elongated fasciculus of fibres placed below and at the side of the tongue, between the hyo-glossus and stylo-glossus externally, and the genio-glossus on the inside, and running from the basis to the apex of the organ. This, however, is only a small part of the fibres of the tongue, the whole structure of which is muscular. It is very difficult to follow the course of the fibres lying under the superior mucous surface; several are transverse, some oblique, and others longitudinal. Their union with each other, and with those of the genio, hyo, and stylo-glossi above described, constitutes an inextricable mixture, and all the fibres not belonging to either of those muscles must be set down to the lingualis. It is this union of muscular fibre, together with more or less of a soft fatty matter, covered by the mucous membrane of the mouth, that constitutes the tongue.

Motions of the Tongue.—These may be considered in two points of view: 1st, as far as they are produced by the fibres of the tongue itself, which form the lingualis; and 2d, those which arise from the action of the exterior muscles. In the first class we may enumerate 1st, a retraction of the tongue in the mouth, by the action of the longitudinal fibres of the lingualis; 2dly, an elongation, short of the passage of the apex between the teeth, from the relaxation of those fibres; 3dly, a curvature in the transverse direction, bringing the point against the surface of the cheek, by means of the lateral longitudinal fibres; 4thly, a curvature of the apex by the inferior fibres, so as to bring it towards the frænum; or by the superior ones, so as to expose the under surface of the tongue when the mouth is opened, to bring the point against the palate, and even to direct it towards the isthmus faucium. It has been supposed, that the apex may be carried backwards in this direction, so as to produce suffocation. It is rather difficult to conceive this, even supposing a very peculiar natural conformation to obtain, as a remarkable looseness of the frænum. But it is altogether out of the question to admit it as a circumstance generally practicable, and capable of being produced at pleasure. The motions now described take place chiefly towards the front of the tongue, which being entirely unattached, has a great power of motion.

The following motions take place in the tongue from the action of the external muscles. It is carried forwards, so that the apex passes between the teeth and the anterior loose portion is protruded from the mouth, by the inferior fibres of the genio-glossi: the os hyoides accompanies the tongue in this motion to some extent, being slightly elevated and carried forwards. The anterior fibres of the genio-glossus, and the stylo-glossus restore the tongue to its former position. The depression of the tongue, considered as affecting the whole organ, is effected by the whole of the genio-glossi, with the hyo-glossi. The elevation of the tongue, as far as the apex is concerned, is chiefly effected, as we have already stated, by the lingualis: the basis is drawn upwards by the stylo-glossus. The whole organ together will be raised in the mouth, and pressed against the palate by the transversus mandibulæ. By the varied and combined actions of the muscles, which are situated towards the sides and middle of the organ, it may be rendered concave or convex in its superior surface. It is not however to these simple motions that the tongue is confined: these may be modified and combined in a variety of ways which it would be difficult to describe with precision, and which we shall best understand by adverting to the functions of the part as an organ of mastication and articulation.

Mastication.—By the parts now described the food is taken into the mouth, and retained there for the purpose of mastication. There is some muscular exertion at its entrance into the mouth: the lips are separated, and slightly everted, exerting sometimes a kind of prehensile power, the lower jaw gently carried downwards. Liquids are taken in by the united agencies of the lips and tongue, which are observed to exert themselves in two ways. The first method is that of suction, and is almost peculiar to the child. The nipple of the mother is embraced by the lips, which contract closely round it from the action of the orbicularis. The tongue formed into a longitudinal channel, by the action of the genio-glossi, is applied in front to the nipple, receives the fluid which comes from that part, and transmits it to the pharynx. When the lips and tongue are thus placed, the enlargement of the chest forms a vacuum in the mouth, and the pressure of the external air on the surface of the breast forces out the milk. We can also drink by immersing the lips in a fluid; and the mechanism is the same, in this instance, as in the preceding. This is the way in which the horse drinks. The other method is by applying the lips to a vessel containing the fluid, in which case also the tongue forms a channel. Here the fluid passes into the mouth chiefly by its own weight, as we in a manner pour it in from the containing vessel. There is a third possible method of taking liquids; but it is very seldom employed; *viz.* by opening the mouth widely, throwing back the head, and pouring them into the throat. The food, whether solid or fluid, is retained in the mouth by closing the aperture, and applying the lips and cheeks against the teeth. It is propelled into the back part of the mouth by means of the lips or cheeks pressing on it; and is moved about into every part of each division of the cavity by the wonderfully quick and varied motions of the tongue, which by the elevation of its sides is formed into a sort of cup for that purpose. Or its point is passed between the teeth to clear the food from the corners and sides of the cavity. At the same time the teeth are either brought together perpendicularly, so as to divide the food by the act of biting; or the inferior molares, by the lateral motions of the lower jaw, grind the alimentary substance against the superior ones, which remain immoveable. The different portions are collected, and repeatedly subjected to this action by the motions of the tongue and cheeks; and when sufficiently reduced, it is placed in a mass on the superior surface of the tongue, previously to swallowing.

This mechanical trituration is of the greatest importance in preparing the food for the action of the digestive organs. For there is no force applied to the aliment in the stomach, or intestines, that can be at all considered as equivalent to the effect of mastication. It is well-known that even the skin of a grape is not broken in its passage through the whole alimentary canal. Imperfect mastication must

therefore

therefore much injure digeftion; and hence old perfons digeft badly, unlefs they cut their food minutely fo as to refemble the effect of chewing. "I can eafily believe," fays a great phyfiologift, "that a much fmaller quantity of food would afford a fufficient proportion of nourifhment, if it were more completely chewed. Hence nature has attached a great pleafure and enjoyment to the performance of this procefs: and I have found the drieft bread become fweet and grateful to the palate, when long and thoroughly chewed." Haller Elem. Phyf. t. 6. p. 40.

Salivary Glands.—The procefs of maftication, if it were performed on the food alone, would reduce it to a dry, or at leaft a very tenacious mafs, that could not be moved about in the mouth for the purpofe of complete trituration, without clogging the teeth very much, and adhering very unpleafantly to the furface of the parts; and that could not certainly be fwallowed without extreme difficulty. Thefe fources of inconvenience are obviated by the falivary and other glandular apparatus placed in the neighbourhood of the mouth, and furnifhing large quantities of fluid for the purpofe of moiftening the food to the requifite degree. The utility of the liquor, poured into the mouth from thefe glands, may be eftimated from the inconvenience experienced when it is too fmall in quantity. When we are eating very dry food, as mealy potatoes, they abforb the faliva very rapidly, and require fo much dilution, that the fluid is not fupplied in fufficient abundance: a difficulty is then experienced in chewing; and the morfel, which has not been duly moiftened, often ftops in the fauces, producing a fenfe of fuffocation, and paffing down to the ftomach very flowly.

The proper falivary glands are three in number; and they refemble each other in their general ftructure, although differing in fituation, form, &c.

The falivary glands are fymmetrical; that is, they are exactly alike on the right and left fides of the body. They are all fituated in the neighbourhood of very moveable parts, and are confequently fubjected by their fituation, to compreffion from the motions of fuch parts. The preffure which they thus experience from the furrounding bones and mufcles contributes to evacuate the contents of their excretory tubes, and to excite a farther fecretion. As the parts, by which the glands are compreffed, are the organs employed in maftication, the fecreted fluid is prepared in large quantity and poured into the mouth at the particular period when its prefence in that cavity is efpecially neceffary. They receive their blood veffels in numerous ramifications, but thefe are generally produced from a large arterial trunk; and feveral branches of nerves from the brain are diftributed in them. They are of a reddifh grey colour, and tolerably firm texture. They are made up of feveral very diftinct lobes, united by a cellular texture; thefe are formed by the conglomeration of many fmaller lobules, in which we can again difcern numerous divifions into ftill fmaller particles. A thin layer of cellular fubftance, continuous with that which unites the different lobes, covers the furface of the gland; and this is again inclofed in a diftinct and tolerably denfe capfule, connected by cellular texture of a loofe kind to the furrounding parts. Each of the minute particles, of which the gland confifts, furnifhes an excretory tube; and thofe of the neighbouring lobuli unite together, forming larger and larger trunks, which open ultimately into the mouth, and poffefs an internal lining continuous with the mucous membrane of that cavity.

The Parotid Gland.—This largeft of the falivary glands derives its name from being fituated near the ear. On removing the integuments and adipous membrane from the fide of the face, a large and flattened glandular mafs, of an irregularly oval figure, is difcovered lying between the mafseter mufcle and external ear before and behind, and the zygoma and angle of the jaw above and below. The gland however is much more confiderable in its bulk than this fuperficial view would indicate: for its fubftance extends confiderably in an internal direction, in the deep hollow behind the ramus of the lower jaw. There is no diftinction between thefe two parts, although we defcribe them feparately.

The external broad portion of the gland extends more or lefs towards the face. Its outer furface is flightly convex, and partly covered by the latiffimus colli, partly by the integuments. It covers a confiderable portion of the maffeter, from which it is feparated by the chief ramifications of the facial nerve: above it extends to the under edge of the zygoma, and lies on the joint of the lower jaw, in fome inftances; below it is not continued further than the ramus of the jaw, and behind it lies againft the cartilage of the ear. The front edge is thin and irregular, and the parotid duct ufually comes off from it about a finger's breadth below the zygoma. A fmall appendix of the gland generally accompanies the duct juft where it emerges. The more internal portion of the gland, which is buried behind the ramus of the lower jaw, is bounded above by the joint of the jaw; in front by the inner furface of the ramus, and the edge of the pterygoideus internus; behind by the meatus auditorius, maftoid procefs and fuperior extremity of the fterno-cleido-maftoideus, internally by the ftyloid procefs and its mufcles, the internal jugular vein and internal carotid artery. The external carotid artery paffes through the fubftance of the gland, towards its pofterior part; and divides in its fubftance into the three branches by which it terminates; *viz.* the fuperficial temporal, the tranfverfalis faciei, and the internal maxillary. Hence thofe veffels feem to emerge from the gland. The facial nerve paffes alfo through the parotid, and divides in its courfe into thofe numerous branches which form the pes anferinus. The nutrient arteries and the nerves of this gland are derived from the trunks of both kinds which traverfe its fubftance. Its weight, as given by Wharton, is four drams and a half.

The *Parotid* or *Stenonian Duct*, coming out of the gland in the fituation already defcribed, paffes in an horizontal direction upon the tendon of the maffeter, and turns inwards at the front edge of that mufcle. Penetrating the fat of the cheek it goes through a divifion in the fibres of the buccinator and opens in the mouth by a very fmall round orifice oppofite to the firft molar tooth of the upper jaw. It is accompanied by feveral vafcular and nervous ramifications; and fituated fuperficially while it is croffing the maffeter. In front of that mufcle it is furrounded by much adipous fubftance, and partly covered by the zygomaticus major. Its coats are very thick, and compofed of a white, denfe, and firm fubftance: the calibre of the veffel is of courfe fmall in comparifon with its bulk. After leaving the parotid gland, it receives the excretory duct of that acceffory portion, which is placed above it.

Sub-maxillary Gland.—This is of a roundifh fhape, much fmaller than the parotid, and weighing about four drams and a half. It confifts of larger lobes than that gland, and is ufually furrounded by feveral lymphatic glands. It occupies the fpace left between the inner furface of the fide of the jaw, the mylo-hyoideus, and the digaftricus. Behind it is continued nearly to the angle of the jaw, and has been fometimes connected with the lower end of the parotid in that fituation: towards the front it is bounded by the anterior portion of the digaftric and the genio-hyoideus. It is covered externally partly by the bafis of the jaw, and partly by

by the latiffimus colli; internally it lies on the lingual nerve, the ftylogloffus, hyogloffus, and facial artery. A portion of this gland, continued behind the back edge of the mylo-hyoideus, joins the fublingual, fo that thefe two are compofed of one continuous fubftance.

The arteries of the fub-maxillary gland are derived from the facial, which is imbedded in the gland, and the lingual. The nerves are from the lingual branch of the inferior maxillary.

The excretory tube of this gland is generally called the *Whartonian Duct*. It is of large fize, and thin in its coats. It comes off from the gland near the appendix above-mentioned, accompanies it behind the mylo-hyoideus, then goes along the inner furface of the fublingual gland to perforate the membrane of the mouth juft at the fide of the frænum of the tongue. The aperture is much fmaller than the diameter of the duct, and it is formed in a projecting and extenfile papilla of the membrane. It is placed, in the firft part of its courfe, between the mylo-hyoideus and hyogloffus: and afterwards between the fublingual gland and genio-gloffus. It is accompanied by the lingual branch of the inferior maxillary nerve.

The *fub-lingual*, or fmalleft of the three falivary glands, is flattened in its figure, and very narrow from fide to fide, but deep from above downwards. It lies, as the name imports, under the tongue, and has the two flat furfaces looking right and left. It is placed between the mylo-hyoideus, and the genio-gloffus: the two glands are parallel, and are feparated by the genio-gloffi mufcles. The mylo-hyoideus covers its outer flat furface, and feparates it from the fub-maxillary gland: the inner is in contact with the genio-gloffus. The front edge touches the fymphyfis of the jaw, while the pofterior reaches to the hyo-gloffus. The fuperior margin forms a projection in the mouth, covered only by the mucous membrane, and extending from the frænum of the tongue backwards, between the under furface of that organ, and the fide of the lower jaw. The arteries come from the lingual, and the nerves from the lingual branch of the inferior maxillary. Haller has given us a minute account of the excretory ducts of this gland in the 6th volume of his great work, fect. 2. § 7. When the fub-maxillary and fub-lingual glands are not connected by the appendix which we have defcribed, and even fometimes when they are, there is a duct fimilar to that of Wharton, accompanying it, and opening clofe to it. More frequently the Whartonian duct receives a large branch from the fub-lingual gland, juft before it opens near the frænum; and often one or two more fub-lingual ducts open into the Whartonian. Other fmaller ducts penetrate the membrane of the mouth on the furface of that longitudinal eminence, which lies by the fide of the tongue; and Haller has fometimes found thefe amounting in number to twenty. Small portions of a doubtful nature are fometimes found near the fub-lingual, and thefe too have openings into the mouth.

The fluid fecreted by thefe glands is a pure and limpid water, as we may afcertain in cafes of falivary fiftulæ, where it may be obferved free from any foreign admixture. But the faliva, as it appears when fpit out of the mouth, is a mucous fluid, and fo vifcid in its nature, that it entangles air in confiderable quantity, and acquires thereby the well-known frothy appearance of fpittle. This mucous portion of the fluid is furnifhed by very numerous fmall glandular maffes difpofed in various fituations of the external furface of the membrane of the mouth, and already noticed, in preceding parts of the prefent article, under the epithets of labial, buccal, palatine, and lingual glands, and tonfils. The fluid formed in thefe glands, deftined to moiften and lubricate the furface of the mouth, is mixed with the water of the proper falivary glands.

Thefe mucous glands are of a roundifh form, fomewhat grey colour, and firm texture. They are very numerous in the lips and palate; and have fhort ducts penetrating the membrane, and leaving confpicuous openings on its furfaces; one or two of a larger fize are occafionally obferved between buccinator and maffeter, and have been defcribed under the name of molares.

Chemical Compofition of the Saliva.—We have already defcribed this fluid as being made up of two different component parts, produced by very different organs. Dr. Thomfon gives the following account of it in the third edition of his Syftem of Chemiftry, vol. v. book 5. fect. 12. "Saliva is a limpid fluid like water, but much more vifcid: it has neither fmell nor tafte. It has a great affinity for oxygen, which it abforbs readily from the air. Befides water, which conftitutes at leaft four-fifths of its bulk, it contains the following ingredients: mucilage, albumen, muriate of foda, phofphate of foda, phofphate of lime, and phofphate of ammonia. The faliva fecreted in the glands above defcribed, muft be conveyed into the mouth by means of a contractile power refiding in the coats of their excretory ducts. Its feparation is going on conftantly, in a greater or lefs degree, fo as to keep the mouth moiftened, and the fuperfluous part is ufually fwallowed. But it is during maftication that thefe organs are moft actively employed, and the fecretion which they then afford is far greater in quantity than what they furnifh in the quiefcent ftate of the organs. The compreffion which the glands experience from the motions of the jaw, and from the furrounding mufcles, is one caufe of this increafed quantity. For the mere motions of the jaws will increafe the fluid of the mouth, even when no food is contained in that cavity. Another explanation has affigned a fpecies of irritation in the glands produced by the prefence of the food, and affifted perhaps by the mind, as in the inftance of the taftes. This muft be allowed to exert an influence, as well as the mechanical preffure. It is known familiarly to every one, that the mere fight or fmell of food will excite the falivary glands of a hungry perfon; and hence the common phrafe of one's mouth watering. Various accidental circumftances will alfo increafe the falivary fecretion, as any fharp or irritating fubftances taken into the mouth; and the effect of mercury in the fame way is well known. The quantity of the falivary fecretion in a healthy perfon can hardly be determined with any degree of accuracy. Nuck calculated from fome experiments that twelve ounces were furnifhed in twenty-four hours; and others have ftated it at a pint and a half. In various inftances of falivary fiftulæ, large quantities of faliva have been difcharged from one gland in a fhort time, as five or fix ounces during fupper time; and it is often poured out very copioufly in perfons affected by mercury.

Paffage of the Food into the Pharynx.—The mafticated mafs is fuppofed to be placed on the dorfum of the tongue, which is extended laterally, and has its margins drawn up by the ftylogloffi, for the purpofe of holding it more conveniently. The mufcles of the lips and cheeks clofe the mouth in every direction; and the lower jaw is alfo elevated, to afford a fixed point to thofe mufcles which draw up the os hyoides. The food cannot, therefore, efcape in any direction. The apex of the tongue is applied againft the palate, fo that the whole tongue reprefents an inclined plane, facing backwards and upwards; the reft of the organ is brought fucceffively in contact with the roof of the mouth from before backwards, and the food is thereby forced through the ifthmus faucium into the pharynx. Thefe motions are performed

formed by the lingualis and ftyloglofſus. The latter muſcle, together with the ftylohyoideus and poſterior portion of the digaſtricus, carries the whole tongue backwards, ſo that it forces the portion of food into the pharynx, and oppoſes any attempt at a return. The part which the tongue has to perform is not ſo great in the act of drinking: the power of ſuction there aids the paſſage of the fluid, which runs along a channel formed in the dorſum of the tongue; that organ is, however, carried backwards in a certain degree, to convey the liquor into the pharynx. The further progreſs of the aliment in the pharynx, and the action which it undergoes in that cavity, cannot be underſtood until the parts have been deſcribed.

The *pharynx* is a large membranous receptacle, placed at the back of the noſe, mouth, and larynx, and communicating freely with thoſe organs. Thus it ſerves as a medium for the paſſage of the atmoſpheric air to and from the lungs, in the proceſs of reſpiration; for the reception of the food, which has undergone trituration in the mouth, and for its propulſion towards the ſtomach. It is adapted to the latter purpoſe by an external covering of muſcular fibres, arranged in ſtrata ſlightly diſtinguiſhed from each other, and deſcribed under the name of conſtrictores pharyngis muſcles. This bag, which is of an elongated form, extends from the baſis of the ſkull above to the point at which the larynx terminates in the trachea below. It is bounded at the ſkull by the baſilar proceſs of the occiput, below by the œſophagus, which is a cylindrical muſcular tube continued from it to the ſtomach; in front by the cavities of the noſe, mouth, and larynx; behind by the cervical vertebræ. Its breadth at the upper part is equal to the ſpace left between the pterygoid proceſſes; it is ſomewhat enlarged towards the middle, oppoſite to the os hyoides and thyroid cartilage, the cornua of which cauſe conſpicuous riſings in the membrane of the pharynx, when the bag is laid open. It diminiſhes gradually in breadth below, ſo as to become ſomewhat funnel-ſhaped: and its moſt contracted portion forms the beginning of the œſophagus. It cannot be regarded as a complete cavity, ſince it is deficient on the anterior part. When its back ſurface is laid open by a perpendicular cut, we ſee nothing in front but the openings of the naſal and laryngeal cavities and mouth. The pharynx is therefore an imperfect bag, common in the greateſt part of its extent to the air and food; and interpoſed between the external openings, which give admiſſion to thoſe, and the reſpiratory and digeſtive organs, which are the points of their ultimate deſtination.

It is firmly attached above to the baſilar proceſs of the occiput, and the body of the ſphenoid, by a ſtrong and denſe aponeurotic ſubſtance, which is gradually loſt on the mucous membrane. It is continued below into the œſophagus, oppoſite the firſt cartilaginous rings of the trachea; and a ſudden contraction at this part, viſible externally, indicates the point of continuity between the two organs. The lateral boundaries are the parts giving origin to the conſtrictor muſcles; *viz.* the pterygoid proceſſes, cornua of the os hyoides, and the ſides of the thyroid and cricoid cartilages.

In taking an internal view of its lateral connections, we find it attached, in a ſeries from above downwards, to the following parts; *viz.* the poſterior openings of the noſe, ſoft palate, back of the mouth, root of the tongue, and larynx. On the front are ſeen the wide openings of the noſe and mouth, towards the upper part; but below the bag poſſeſſes an anterior portion, which is cloſely connected to the root of the tongue, and which lies againſt the back of the larynx.

The external ſurface of the bag is connected to the bodies of the vertebræ behind by a looſe cellular ſubſtance: and along its ſides we notice the courſe of the carotid arteries and jugular veins.

The ſides of the pharynx are compoſed of muſcular fibres externally, and of membrane on the inſide. The latter is a continuation of the general mucous membrane, which belongs to the digeſtive and reſpiratory organs. This is expanded in an uniform manner over the poſterior ſurface of the bag, and by its anterior prolongations on either ſide becomes continuous with various parts. Above it is continued at the choanæ narium with the pituitary membrane, and the lining of the Euſtachian tube: lower down it is connected with the pharyngo-palatine arches, and through them with the lining of the mouth; lower ſtill it paſſes over the front of the larynx, and covers the projection which the back of that organ makes into the front of the pharynx. At the opening of the glottis it becomes continuous with the membrane that lines the organ of the voice. At the top of the pharynx it is extended along the under ſurface of the body of the ſphenoid bone, and thus becomes continuous with the pituitary membrane at the upper margin of the choanæ narium. At the bottom it is prolonged by a circular continuation into the œſophagus. It is ſmooth on its ſurface, and poſſeſſes conſiderable vaſcularity: it contains many mucous glands, affording a ſecretion which moiſtens the part, and facilitates the paſſage of the food through its cavity.

Muſcles of the Pharynx.—Theſe are four in number, according to the arrangement of the moderns; but much more numerous in the deſcriptions of ſome older writers. It follows neceſſarily, from the preceding deſcription, that they muſt be ſituated at the back of the pharynx; and they may be moſt conveniently brought into view by removing the head at the firſt vertebra, and leaving the pharynx and larynx connected to the baſis of the ſkull. We ſhall then diſcover three broad, thin, and flattened muſcles, named *conſtrictores pharyngis*, expanded like an uniform muſcular coat at the back and ſides of the bag; diſtinct from each other only at their origin, but intimately united on the pharynx, where they overlap each other ſucceſſively. The fibres from the right and left ſides meet together in the middle, and there is a white longitudinal line marking the junction: the reader will therefore underſtand, that each conſtrictor has the ſame attachments on both ſides of the body.

Conſtrictor pharyngis inferior (thyreo-pharyngeus and crico-pharyngeus).—This ariſes from the ſide of the cricoid cartilage, from the inferior cornu, and back of the ala of the thyroid; its fibres all proceed backwards, to expand over the lower part of the pharynx. The ſuperior portion aſcends obliquely towards the middle of the bag, where, together with thoſe of the oppoſite ſide, they terminate in a pointed form; the middle fibres are tranſverſe, and the inferior deſcend ſlightly, and ſurrounding the commencement of the œſophagus, are cloſely united to the muſcular covering of that organ. Hence its figure approaches on the whole to the lozenge. It is in contact, by its poſterior ſurface, with the muſcles on the front of the vertebræ; and entirely with the middle conſtrictor, ſtylo-pharyngeus, palato-pharyngeus, and membrane of the pharynx. It is covered a little at the ſide by the thyroid gland.

Conſtrictor pharyngis medius (hyo-pharyngeus).—This muſcle is exactly of the lozenge figure. Its origin is from the cornu of the os hyoides, and its fibres purſue very different directions in their expanſion over the middle of the bag. The lower ones deſcend very obliquely, and form a pointed end, covered for a conſiderable extent by the preceding muſcle; the middle ones purſue a tranſverſe courſe, and the ſuperior aſcend to terminate by a ſharp extremity fixed above

into the basilar process of the occiput. The external surface of this muscle is covered, just at its origin, by the hyoglossus: in the rest of its extent it is covered by the inferior constrictor, or is in contact with the front of the vertebræ. On its anterior surface it is in contact with the superior constrictor, with the stylo-pharyngeus, palato-pharyngeus, and membrane of the pharynx.

Constrictor pharyngis supremus (pterygo-pharyngeus, mylo-pharyngeus, and glosso-pharyngeus).—Its fibres are transverse and parallel to each other, and cover the top of the bag. Its origins are the inferior half of the internal pterygoid plate, the attachment of the buccinator to both jaws, and the sides of the base of the tongue. Some of the upper fibres ascend a little to be fixed to the basilar part of the occiput. Covered behind chiefly by the preceding muscle, it is contact in front with the circumflexus palati, palato-pharyngeus, and membrane of the pharynx.

The action of these three muscles consists in contracting the pharynx, and propelling the food through it towards the stomach.

Stylo-pharyngeus.—This is a thin elongated muscle, placed at the side and back part of the pharynx, arising from the root of the styloid process, descending downwards and inwards, and passing under the middle constrictor to expand its fibres over the bag, and unite with the surrounding muscles. It has an attachment also to the thyroid cartilage: it elevates and expands the pharynx.

Cavity of the Pharynx.—When we have laid open the pharynx by a longitudinal incision extending along the whole length of its posterior surface, we see the soft palate hanging down into the middle anterior portion of the cavity, and separating the posterior openings of the nose from that of the mouth. Above the soft palate are two large and somewhat oval apertures, the posterior openings of the nose (choanæ narium), for a description of which see the article Nose. Through these the atmospheric air is constantly passing into and out of the pharynx, in its progress to and from the lungs in the alternate processes of inspiration and expiration. Through these openings also polypous tumours descend from the nose into the pharynx, and are then visible from the throat. In the same way the mucous secretion of the nose is drawn into the pharynx; from which it is expelled by the mouth in the act of spitting.

The Eustachian tube, or canal, which conveys the external air to the cavity of the tympanum, commences from the throat just opposite to the middle meatus narium. Its broad or trumpet-shaped opening is placed in the point of communication between the nose and pharynx, and is kept permanently open by the cartilaginous nature of its structure. Just behind the aperture a considerable swelling is observed, caused by a piece of the cartilage. For a more particular account of this tube, see Ear.

The contracted opening of the mouth into the pharynx (*isthmus faucium*) is placed just under the soft palate. The mode in which this communication is formed has been already described in the present article. The size of this aperture, and the situation of the velum palati, are subject to much variation at different times. The soft palate may be drawn down against the tongue, and its two surfaces will then be anterior and posterior. It may be elevated so as to shut the choanæ narium, and then the surfaces, which before were anterior and posterior, become exactly reversed. In the mid state between the two just mentioned, the velum will be parallel to the horizon, and the posterior surface is then superior, and the anterior is inferior. The choanæ narium are closed by the velum palati during the act of vomiting; when the contents of the stomach are thrown forcibly up the œsophagus and pharynx, and would enter the nostrils, if they were not closed by the elevation of the velum. Some of the ejected matter does actually pass in this direction, which we cannot be surprized at, when we consider the violence with which it is driven into the pharynx. The soft palate is also drawn up in the same way, when the process of respiration is carried on through the mouth only. Haller mentions an instance, in which fluids injected from one nostril returned through the other, which can only be explained by the elevation of the soft palate.

The larynx projects into the lower part of the front of the pharynx. In the middle and upper part of this projection there is a large opening, named the glottis, which is the entrance of the larynx. This is situated just at the root of the tongue, so that all the food necessarily passes over it in the act of deglutition; yet the membrane of the larynx is so exquisitely sensible, that it cannot bear the contact of a foreign body. When by accident any extraneous substance touches this delicately organized part, a convulsive cough is excited to expel the cause of irritation. A drop of pure water is sufficient to produce this effect; and if the offending matter be not immediately dislodged, a sense of suffocation and the most distressing and painful feelings ensue. If we reflect on the fatal consequences that are almost immediately attendant on the interruption of respiration, we shall consider this acute sensibility of the lining of the trachea and larynx as a wise provision against suffocation; by which we receive the alarm on the most distant approach of danger. Since then all the aliment must pass over the glottis, and the entrance of any particle into the cavity must be most carefully guarded against, we have a moveable valve, called the epiglottis, closely connected with the root of the tongue. For a more particular description of the glottis and epiglottis, see the article Larynx.

Progress of the Food in Deglutition.—At the time that the elevation and retraction of the tongue urges the morsel of aliment into the pharynx, the velum palati is drawn up against the choanæ narium. Hence when the soft palate is either partially destroyed by ulceration, or so diseased as to have its motions impaired, substances which we swallow get into the back opening of the nose.

The elevation and dilatation of the pharynx are accompanied by a similar motion of the larynx, which closes the glottis, and therefore prevents the food from entering that cavity. The powers producing that elevation are the stylo-glossi, stylo-hyoidei, stylo-pharyngei, mylo-hyoidei, genio-hyoidei, digastrici, and hyo-thyroidei. Now when the larynx is raised, it is rather inclined forwards, so that the glottis is brought under the epiglottis, which amply covers it. The closing of the mouth, and approximation of the jaws, which take place when we swallow, favour the elevation of the larynx, by affording a fixed point for the action of its muscles. This indeed is not essential, as we can swallow (fluids in particular) with the mouth open; but the act of deglutition is then inconvenient and dangerous.

The elevation and retraction of the tongue, by which the food is thrust into the pharynx, contribute also to the application of the epiglottis over the opening of the larynx. For by such motion of the tongue, the valve is turned backwards and downwards, and thereby meets the ascending larynx. Yet this is not necessary; for we can prove on the dead subject, that the mere elevation of the larynx will close the glottis, while the tongue is not moved at all; and indeed, if we advert to the connexions of the genio-hyoidei and genio-glossi, we must suppose that the tongue often does not contribute to the effect in question. Hence we shall find that deglutition is practicable with the tongue held firmly to the

the palate. Some phyſiologiſts have ſtated, that the food, by its preſſure on the epiglottis, depreſſes that organ more completely, and applies it more cloſely over the opening; and this appears probable enough reſpecting the more ſolid maſſes: but if we conſider that a drop of fluid, totally inadequate to produce any effect on the epiglottis, is ſwallowed juſt as well as the heavier portions of aliment, we ſhall not aſcribe much influence to this cauſe.

It is obvious, from the preceding account, that reſpiration muſt experience a temporary interruption, while the food is paſſing over the epiglottis. Hence if a perſon imprudently laugh, or attempt to ſpeak, while he is ſwallowing, the eſcape of air from the lungs, which is neceſſary in both caſes, lifts up the epiglottis, and gives admiſſion to the food, which is then not inaptly ſtated in common language to go the wrong way. No ſooner has the food paſſed into the pharynx, than the tongue aſcends, and the larynx is reſtored to its former poſition; the glottis becomes again open for reſpiration, which had ſuffered a merely momentary interruption. We cannot conclude this part of the ſubject without making one obſervation, which will naturally ſuggeſt itſelf to the reflecting mind, on the conſideration of the parts whoſe functions we are now deſcribing. We ſee that nature has deſtined the ſame organ to the performance of two important proceſſes: that the lungs derive their ſupply of air through the pharynx, and that the ſame tube conveys our food to the ſtomach; alſo, that the courſe of the aliment is eſtabliſhed directly over the opening that admits the air. We know, at the ſame time, that ſo cloſe a connexion ſubſiſts between life and reſpiration; that the interruption of this function, even for a very ſhort time, produces inevitable death. Now we can ſee very clearly, that if the glottis were left open when we ſwallow, ſuffocation would be a probable conſequence of the firſt meal, from the entrance of the food into the trachea. Hence the cloſure of the glottis has not been entruſted to the agency of any of thoſe means, which depend on the exertions of the will, which are always irregular and uncertain, and influenced by numerous circumſtances liable to change, from alterations in the bodily or mental ſtate of individuals; but it follows as a neceſſary and mechanical conſequence from certain motions of the organs, and will take place in the dead as well as in the living ſubject. Further, the very ſame condition of parts, which produces the danger, brings with it the proviſion againſt that danger. The riſk obtains only in the act of ſwallowing; and the elevation of the larynx, which is an eſſential part of the proceſs of deglutition, cloſes the glottis, and thereby obviates the riſk.

From the connexion ſubſiſting between the larynx and pharynx, as we have already explained, the latter part is elevated together with the former. It is at the ſame time dilated by the ſtylo-pharyngei; and, as the larynx is rather carried forwards, a greater ſpace is left between it and the vertebræ for the diſtenſion of the pharynx.

The ſoft palate, which at firſt was drawn up againſt the back openings of the noſtrils, is again depreſſed, as ſoon as the food has paſſed the iſthmus; and its depreſſion aſſiſts in promoting the deſcent of the food into the pharynx. This motion is performed by the palato-gloſſus and palato-pharyngeus, which bring the velum palati in contact with the back of the tongue, and thereby cut off the return of the food into the mouth, at the ſame time that its deſcent is aſſiſted. This part of the proceſs is performed with difficulty when the tonſils are ſwelled and inflamed; and the palate is not completely depreſſed at that time. No ſooner has the food entered the pharynx than that bag contracts, and then the ſpace between the tongue and vertebræ is deſtroyed by the approximation of the poſterior part of the pharynx to the tongue. This motion ſeems to ariſe from the irritation produced by the preſence of the food; for we cannot avoid ſwallowing whatever has entered the fauces. The action of the ſuperior conſtrictor muſcle draws the upper part of the pharynx againſt the ſoft palate, and thereby prevents the food, when preſſed by the muſcular powers below, from riſing towards the noſe; while the approximation of the palate itſelf to the root of the tongue prevents it from aſcending again into that cavity. The ſucceſſive contractions of the middle and lower conſtrictors now urge the food through the pharynx into the œſophagus; the arytenoidei probably cloſing the rima glottidis while the food paſſes behind that part. The larynx is now reſtored to its natural poſition by the ſterno-hyoidei, ſterno-thyroidei, and omo-hyoidei; the epiglottis riſes by its own elaſticity; and the levator palati and azygus would bring back the palate and uvula to their uſual condition.

We ſee, therefore, that the buſineſs of deglutition requires the concurrence of numerous parts, and the co-operation of ſeveral motions, and becomes conſequently a complicated and difficult ſtudy. We can underſtand how eaſily the proceſs may be deranged and impaired by the effects of accident or diſeaſe; as by wounds or diſeaſe of the tongue, by ulcers of the palate and tonſils, or fiſſures either in the bony or ſoft palates, by deſtruction of the epiglottis, or by diſeaſe affecting its motions, &c. We obſerve, alſo, that although the paſſage from the mouth to the ſtomach is placed perpendicularly, the aliment by no means deſcends from its own weight, but is urged through the whole courſe by muſcular contraction. Hence we may ſwallow with the trunk inverted; and in ſeveral animals the food paſſes upwards to the ſtomach. Hence deglutition is deſtroyed altogether by paralytic affections of the muſcles concerned in it. The ſwallowing of fluids can no more be effected by their own weight than that of ſolids: the contact of the ſides of the pharynx and œſophagus preſents an obſtacle which a mouthful of fluid is not capable of overcoming, and which requires a contraction of the muſcles. Between the oppoſing ſides of the tube, and the contracting fibres of the organ, fluids are collected into a globular form, like the more ſolid ſpecies of food; as we may obſerve in a horſe when drinking, where the paſſage of the fluid in the manner juſt deſcribed is very obvious.

The *œſophagus* is a cylindrical muſculo-membranous tube, extending from the pharynx to the ſtomach, and deſigned to convey the food from the former to the latter of theſe organs.

It deſcends through the lower part of the neck, between the trachea and the vertebræ; being not exactly behind, but rather to the left of that tube. In enters the cheſt in company with the trachea, between the two bags of the pleura; paſſes behind the left branches, and to the right of the arch of the aorta; then, turning over the deſcending aorta, goes behind the left muſcle, and deſcends through the poſterior mediaſtinum, juſt in front of that part of the aorta which lies againſt the vertebræ of the back. At its lower part it advances ſlightly forwards from the vertebral column, paſſes through the cardiac aperture of the diaphragm, and terminates in the ſtomach.

The connexions of the œſophagus to the ſurrounding parts are formed by a looſe cellular texture; on the front it is covered, in the neck, by the trachea, by a part of the thyroid gland, the left inferior thyroid veſſels, and the ſterno-thyroideus of the ſame ſide; in the cheſt, by the end of the trachea, and left bronchus, the back of the pericardium, and baſe of the heart. It correſponds behind, in the

neck, to the column of vertebræ, where it is covered by the longus colli; in the back to the thoracic duct above, and to the whole of the descending aorta.

The internal jugular veins and carotid arteries are on its lateral aspects in the neck; the recurrent nerve is also near it on the left: in the upper part of the chest, the arch of the aorta lies on its left, and lower down the two pleuræ cover its sides. At its very termination it is connected in its whole circumference to the cardiac orifice of the diaphragm. It is surrounded, in the lower part of its course, by the plexus formed by the nerves of the eighth pair.

This canal, in its empty state, collapses, and is then flat on its anterior and posterior aspects: when distended, it is cylindrical, and may have a diameter of three quarters of an inch, or more. It is usually rather contracted, where it passes the diaphragm. It is, on the whole, the narrowest portion of the alimentary canal. It extends in length from the fifth cervical to the ninth dorsal vertebra.

It is made up of two parts, very different in their structure, connected by cellular substance. The external surface is composed of a muscular expansion, called sometimes tunica muscularis œsophagi, and possessing such thickness, that the œsophagus may be deemed the most muscular part of the alimentary tube. It is made up of fibres following two opposite directions. The external stratum is the strongest, and has a longitudinal direction; they radiate below over the stomach; the internal are transverse, and describe right angles with the former.

The internal covering of the œsophagus (*tunica interna, vasculosa*, or *nervea*) is a white smooth membrane, continued from the mucous lining of the pharynx. Its surface is dense and firm. It forms numerous longitudinal folds, and consequently admits very easily of dilatation. It is connected by such a loose cellular substance to the muscular covering, and possesses so much less elasticity, that when the tube is cut transversely, the latter retracts, and leaves a portion of the membranous lining protruding from the cut edge in a flaccid form. Hence a divided œsophagus seems to consist of two tubes placed one within the other; an external thicker, red, and fleshy; an internal thinner, white, and membranous. Small openings are seen on its surface, which are the orifices of mucous excretory ducts, arising from small glands situated between the two coverings of the œsophagus. It contains a large network of vessels, and becomes quite red from minute injections. It is continuous above with the lining of the pharynx, and below with that of the stomach; from which, however, it is manifestly distinguished by a distinct and abrupt line of separation, which marks the commencement of the villous surface.

This tube receives the food from the lower part of the pharynx, and urges it forwards into the stomach by the successive action of its transverse fibres: the longitudinal fibres seem to have the effect of shortening the tube, and dilating it for the reception of the food. The diaphragm presses on it in its contraction, so as to prevent the passage of food, and even so as to impede the egress of air from the stomach.

Deglutition, *Difficulty of*. See Dysphagia.

DEGNECHAM, or Dennecham, in *Geography*, a town of Holland in Overyssel, seated on the Dinckel; 10 miles N.W. of Bentheim.

DEGNEZO, a town of Transylvania; 10 miles N.W. of Bistricz.

DEGNIZLU, or Denizstey, a town of Asiatic Turkey, in the province of Natolia, near the ruins of the ancient Laodicea, destroyed by an earthquake, which swallowed up many of the inhabitants: excellent grapes grow in the environs; to the east and south are mountains covered with snow; 108 miles E.S.E. of Smyrna. N. lat. 37° 51′. E. long. 29° 14′.

DEGO, a small town of France, in the department of the Tanaro, chief place of a canton, in the district of Acqui, with a population of 1627 individuals. The canton contains 3 communes, and 6619 inhabitants.

Dego is situated near the river Bermida, and is remarkable for a victory gained in its neighbourhood over the Austrians, by the French under Bonaparte, in 1796.

DEGOMBAH, a Mahometan kingdom of Africa, situated immediately to the east of Kong, or Gonjah, (the Conche of D'Anville,) and opposite to the Gold coast. Its capital is Degomba, N. lat. 12° 50′. W. long. 0° 30′. This country has on the W. Gonjah, to the N. Kaffaba, to the E. Kambah, and to the S. between it and the Gold coast Tonouwah. It abounds with gold, with which it supplies the merchants of Fezzan; and its inhabitants are distinguished by the custom of taming the elephant, and by that of selling for slaves the prisoners they take from such of the bordering nations as motives of religion or avarice prompt them to invade. Afric. Assoc. p. 176.

DEGRADATION, in *Geology*, is a term which Mr. Kirwan has used (Geol. Ess. 437.) for the lowering or disintegration of mountains, in some theories which endeavour to account for the formation of what are called alluvial or secondary strata. See Secondary and Flætz Strata.

Degradation, in our *Law-Books*, called disgradation, and deposition, the act of depriving, or stripping a person for ever of a dignity, or degree of honour; and taking away the title, badge, and privileges thereof.

The degradations of a peer, a priest, a knight, a gentleman, an officer, &c. are performed with divers ceremonies. That which anciently obtained in degrading a person from his nobility, is very curious. It was practised in the time of Francis I. upon captain Fangel, who had in a cowardly manner given up Fontarabia, whereof he was governor.

On this occasion, twenty or thirty cavaliers, without blemish or reproach, were assembled; before whom the gentleman was accused of treason, and breach of faith, by a king at arms. Two scaffolds were erected; the one for the judges, heralds, and pursuivants; and the other for the guilty cavalier, who was armed at all points, and his shield placed on a stake before him, reversed with the point upwards. On one side assisted twelve priests, in surplices, who sung the vigils of the dead. At the close of each psalm they made a pause, during which the officers of arms stripped the condemned of some piece of his armour, beginning with the helmet, and proceeding thus, till he was quite disarmed; which done, they broke his shield in three pieces with a hammer. Then the king at arms emptied a bason of hot water on the criminal's head; and the judges, putting on mourning habits, went to the church. This done, the degraded was drawn from off the scaffold, with a rope tied under his arm-pits, laid on a bier, and covered with mortuary cloths; the priest singing some of the prayers for the dead, and then he was delivered to the civil judge, and the executioner of justice.

For a more domestic instance: sir Andrew Harcla, earl of Carlisle, being attainted and convicted of treason, 18 Edw. II. *coram rege*; after judgment was pronounced on him, his sword was broken over his head, and his spurs hewn off his heels; sir Anthony Lucy, the judge, saying to him, "Andrew, now thou art no knight, but a knave." By stat. 13 Car. II. William lord Monson, sir Henry Mildmay, and others, were degraded from all titles of honour, dignities, and pre-eminences, and prohibited to bear, or use, the title of

of lord, knight, esquire, or gentleman, or any coat of arms, for ever afterwards.

It has been maintained that the king may degrade a peer; but it appears from later authorities, that he cannot be degraded but by act of parliament.

As to ecclesiastics, we have an instance of degradation before condemnation to death, in the eighth century, at Constantinople. It is in the person of the patriarch Constantine, whom Constantine Copronymus caused to be executed. He was made to ascend the ambo; and the patriarch Nicetas sent some of his bishops to strip him of the pallium, and anathematized him: then they made him go out of the church backwards.

But we have a much later instance in our own history: when Cranmer, archbishop of Canterbury, was degraded, by order of queen Mary, they dressed him in episcopal robes, made only of canvas, put the mitre on his head, and the pastoral staff in his hand; and in this attire shewed him to the people. Which done they stripped him again piece by piece.

At present they do not stand so much on the ceremony of degradation, in order to the putting of a priest to death; by reason of the delays and difficulties that it would occasion. Pope Boniface pronounced, that six bishops were required to degrade a priest; but the difficulty of assembling so many bishops, rendered the punishment frequently impracticable.

With us, a priest, after having been delivered to his ordinary, if he cannot purge himself of the crime laid at his door, has his gown, and other robes, stripped over his ears by the common hangman; by which he is declared divested of his orders.

It is decided, however, that degradation does not efface the priestly character.

Degradation only seems to differ from deposition in a few ignominious ceremonies; which custom has added thereto. Accordingly in the business of Arnoul, archbishop of Rheims, sentenced in the council of Orleans, in 991, it was deliberated, what form they should follow in the deposition; whether that of the canons, that is, simple deposition; or that of custom, *viz.* degradation. And it was declared, that he should surrender the ring, pastoral staff, and pallium; but that his robes should not be torn off.

In effect, the canons prescribe no more than a mere reading of the sentence. It is the rest, therefore, added thereto by custom, *viz.* the stripping off the ornaments, and the tearing the pontifical vestments, that properly constitutes degradation.

Degradation, in *Painting*, expresses the lessening and rendering dim and confused the appearance of distant objects in a landscape, so that they shall appear there, as they would do to an eye placed at that distance from them. See Perspective.

DEGRADED, in *Heraldry*. A cross degraded, is a cross marked, or divided into steps at each end, diminishing as they ascend towards the middle, or centre; by the French called *perronnée*. See Cross.

DEGREE, in *Algebra*, denotes the highest power of the unknown quantity in an equation, *viz.* the equation is said to be simple or of the first degree, when it contains only the unknown quantity in its simplest state; it is said to be of the second degree, when the square of the unknown quantity is the highest power of that quantity contained in it; when that highest power is the cube of the unknown quantity, the equation is said to be of the third order, and so forth.

Degrees, in *General*, are parts of a quantity, which is arbitrarily divided into a certain number of those parts. Geometrical extension is in itself destitute of divisions; the augmentation, and the decrease of natural powers, or forces, are (as far as we can perceive) progressive and uninterrupted accumulations, or diminutions of such powers, wherein no natural steps or divisions can be discerned. Thus the scale of heat rises progressively; the scale of moisture in the air, which is indicated by the hygrometer, varies uninterruptedly from the lowest to the highest state of saturation; and so forth. Yet, notwithstanding the close continuation of those progressions, we have degrees of a circle, degrees of heat, degrees of moisture, &c. These degrees then only denote small accumulations of those powers, or certain aliquot parts of a given extension, which have been agreed upon by various persons, and have been adopted for the purpose of understanding each other; or for expressing, without circumlocution, certain quantities of those powers, or certain parts of a given circular extent.

The weight of bodies, the intensity of light, the quantity of rectilineal geometrical extension, &c. are, by common consent, likewise divided into parts; but those parts are not always called degrees. Thus the weights of bodies are denoted by pounds, ounces, grains, &c.; rectilineal extension is expressed by miles, feet, inches, and so on. In geometry and in trigonometry, the appellation of degrees has been applied to angular magnitude, which is measured by the portion of the circumference of a circle, whose centre coincides with the vertex of the angle, and part of whose circumference is contained between the sides or legs of the same angle. The magnitude or quantity of angles is reckoned in degrees; because the curvature of the circle being uniform in all its parts, equal angles at the centre are subtended by equal arcs, and by similar arcs in peripheries of different diameters. This denomination of degrees is also applied to denote the intensity of heat, the quantity of aerial moisture, and occasionally, or less frequently, to some other natural powers.

The circumference of a circle, whatever the size of it may be, is supposed to be divided into 360 equal parts, called *degrees*; hence, instead of saying that a certain angle comprehends the tenth part of the circumference of a circle, we call it *an angle of* 36 *degrees*; 36 being exactly the tenth part of 360. Also an angle, which comprehends the 360th part of the circumference of a circle, is called an angle of one degree, and so of the rest. But as the angle might not coincide with any of the degrees, therefore each degree was supposed to be divided into 60 equal parts, called *minutes*; also each minute was supposed to be divided into 60 equal parts, called *seconds*; each second into 60 equal parts, called *thirds*, and so on. Then if an angle does not coincide with any of the degrees, it may coincide with one of the minutes, or of the seconds, &c.; it may, for instance, be equal to 11 degrees, 15 minutes, 3 seconds, and 45 thirds. For the sake of brevity, instead of the words, the number of degrees is marked by a little ° set over the figure, a little on the right hand side of it; the number of minutes is marked with a little comma in the same place, the number of seconds with two such commas, the third with three, &c. Therefore the proper or customary mode of writing the above-mentioned angle is thus, $11° \ 15' \ 3'' \ 45'''$. But since the instruments made for the purpose of measuring angles are not calculated to shew divisions smaller than seconds, therefore the present more usual way of expressing angles, is by writing degrees, minutes, seconds, and decimals of a second, as, for instance, $82° \ 13' \ 42''.347$.

It may be naturally inquired how the circle came to be divided into 360 degrees, in preference to any other number of parts? but in answer to this we can only offer a conjecture,

jecture, that the Egyptians, to whom this divifion is attributed, chofe the number 360 on account of its admitting many divifors; and perhaps alfo on account of its nearly equalling the number of days in the year, in which the fun performs its annual revolution in the zodiac. But notwithftanding the long eftablifhed ufe of this divifion, there have not been wanting perfons, who at various times have endeavoured to recommend and to introduce a decimal or a centefimal divifion, inftead of the above-mentioned one. Stevinus, Oughtred, Wallis, Briggs, Gellibrand, Newton, and lately Hutton, befides feveral others, have been of this opinion. Stevinus afferts, that this divifion of the circle obtained in the wife age, "in fæculo fapiente," (Stev. Cofmog. l. i. def 6.) Hutton propofed to divide the quadrant into equal decimal parts of the radius; by which means the degrees or divifions of the arc would be the real lengths of the arcs in parts of the radius. See his paper in the Phil. Tranf. for 1783. Tables of fines, chords, &c. have even been calculated and publifhed upon thofe plans; and lately, in France, the decimal divifion of the circle was actually adopted; but it appears that this new mode is attended with very little advantage in practical calculation, at the fame time that it proves very difficult in the practice of dividing inftruments, and liable to occafion perplexity and confufion in the comparifon of the new ftatements with thofe which fill all the innumerable and well-eftablifhed aftronomical, trigonometrical, and other books. See DIVISION *of Inftruments*.

The inftruments generally ufed for the purpofe of meafuring or of laying off degrees, minutes, &c. in aftronomy, navigation, furveying, and other branches of mixed mathematics, are quadrants, circles, fextants, fectors, theodolites, micrometers, protractors, and others. See the nature and the ufe of thofe inftruments under the articles of their various names.

The denomination of degrees has likewife been applied to a variety of other inftruments; but principally to thermometers and hygrometers. Their meaning in thofe inftruments is various. In the thermometer and the hygrometer, the degrees are only parts of the diftance run through between two fixed points. Thus in the thermometer the length of tube through which the rarefied mercury runs between the point of melting ice, and that of boiling water, is divided into a number of equal parts, which are called the degrees of the thermometer; and the fame kind of divifions, or of degrees, is carried on below and above the faid fixed points. But that very fame length of tube, which lies between the above-mentioned two fixed points, is divided differently by different philofophers. In Fahrenheit's thermometer, it is divided into 180 degrees; in Reaumur's, it is divided into 80 degrees; in Delifle's, it is divided into 150 degrees; in the centigrade thermometer, it is divided into 100 degrees, &c. Hence, in order to know what part of the fcale of heat a degree, or a given number of degrees, means, we muft firft know whether the thermometer is divided according to Fahrenheit, or to Reaumur, or other perfon. See THERMOMETER.

The degrees of the thermometer are marked with a little ° above and towards the right-hand fide of the figure or figures, as 45°, 12°, &c.; but they are not fubdivided into minutes and feconds. Their parts are only expreffed by means of vulgar or decimal fractions; thus 14 degrees and three quarters of a degree, are expreffed by $14°\frac{3}{4}$, or by 14°.75.

The authors who originally propofed and adopted the above-mentioned various divifions of the thermometer, were undoubtedly induced to adopt their peculiar modes by various confiderations, which at prefent are imperfectly known; nor indeed do they deferve any particular inquiry. It is, however, curious to obferve, that Reaumur's degrees are thoufandths of the bulk of his diluted alcohol, with which he filled his thermometers; Delifle's degrees are thoufandths of the bulk of the mercury, neglecting the expanfion of the glafs; and Fahrenheit's degrees are nearly thoufandths parts of the bulk of the mercury, without the laft-mentioned inaccuracy.

It has been faid above, that the degrees of the thermometer are equal parts of the fpace run through by the mercury between the points of melting ice and boiling water. This, however, is only the cafe with the mercurial thermometer, in which the degrees indicate nearly equal inerements of heat; but in the fpirit-thermometer, when properly conftructed, the degrees are not equal, becaufe, with equal increments of heat, the bulk of fpirit of wine increafes unequally; hence the fpirit-thermometer is divided with unequal degrees; but fo as to anfwer to the equal degrees of the mercurial thermometer, *viz.* fo as to indicate nearly equal increments of heat. See EXPANSION and THERMOMETER.

In the beft hygrometers, the degrees are equal parts of the expanfion of the hygrometrical fubftance between the points of extreme drynefs, and complete moifture; and that fpace is divided into 100 equal parts or degrees, which are likewife marked with a little ° over the figure. But in a great variety of common hygrometers, the degrees are merely arbitrary divifions, the meaning of which cannot properly be underftood; as moft of thofe hygrometers have no fixed points, and of courfe they cannot be compared with one another.

A fimilar ufe of the word degrees muft be underftood with refpect to other graduated inftruments, which need not be particularly fpecified.

The denominations of minutes and feconds, befides their denoting the parts of a degree of a circle, are likewife ufed to denote the parts of an hour in the menfuration of time; an hour being divided into 60 minutes, and a minute into 60 feconds. But, when ufed for the menfuration of time, the minutes are more commonly (though not always) marked with a little ^{m}, and the feconds with a little ^{s}, inftead of the comma or commas. Thus 13° 41′ 12″ means 13 degrees, 41 minutes, and 12 feconds of a circle; and $13^{h}\ 41^{m}\ 12^{s}$, means 13 hours, 41 minutes, and 12 feconds of time.

It is alfo ufual to fay, that fuch a ftar is elevated fo many degrees above the horizon, meafured in a vertical circle, or declines fo many degrees from the equator; and that fuch a town is fituated in fo many degrees of latitude and longitude; and, moreover, that a fign of the zodiac includes 30 degrees.

DEGREE, in *Aftronomy* and *Geography*. All circles being fuppofed to be divided into degrees, as explained above; we fay degree of latitude, of longitude, of right afcenfion and declination, to exprefs a 360th part of the circle on which thofe quantities are meafured. See LATITUDE, LONGITUDE, &c. &c.

If the earth were a fphere, all the degrees on the fame circle would be equal; but, on the fuppofition of its being a fpheroid, or any irregular figure, we do not define a degree to be exactly the 360th part of the whole of a given circle, but fuch a part of it as correfponds with a degree in the heavens. The terreftrial degrees, therefore, are unequal, and vary according to the nature of the curve to which they belong. Thus, the degrees of the meridian are parts of an ellipfe; and the degree perpendicular to the meridian will be part of a curve of double curvature; for

for the prime vertical in the heavens is ſuppoſed to be formed by a circle paſſing through the zenith of the ſpectator at right angles to the meridian. The line paſſing through all the points on the ſurface of the earth, that have their zeniths in this circle, is the perpendicular to the meridian, and is on the ſpheroid a curve of double curvature, except at the equator and the poles. At the equator it is the equator itſelf, and at the poles a meridian. For let A (*Plate* VI. *Aſtronomy*, *fig.* 47.) be a place ſituated between the pole and the equator, and A B B be the perpendicular to the meridian P A. The firſt element, or ſide of this line, will be in the plane A M B, determined by the vertical A M, and the ſide A B. For the ſame reaſon, the ſecond ſide B B′ will be in the plane B M B′, B N B′ being the vertical of the point B. From the nature of the ſpheroid, C M is always greater than C N; the vertical B N will be, therefore, inclined to the plane A M B, as will likewiſe the line B B′, which repreſents the prolongation of the line A B, bent in the direction of a ſtraight line parallel to B N. It can be equally proved, that BB″ ſeparates from the plane B N B′; conſequently, the four points A, B′, B″, B‴, are not in the ſame plane. Thus, finally, the perpendicular to the meridian is, in general, a curve of double curvature.

The degrees of latitude which, on a ſphere, would be equal, increaſe as they approach the pole on an oblate ſpheroid. The degrees of longitude are always equal on the ſame circle, both on the ſphere and regular ſpheroid.

On the ſphere they decreaſe as they recede from the equator, in the proportion of radius to the coſine of the latitude. On a ſpheroid, the degree of longitude is equal to a degree of a great circle perpendicular to the meridian, multiplied by the coſine of the latitude, as will be demonſtrated hereafter.

Meaſurement of a Degree.

It is by the meaſurement of different degrees on the ſurface of the earth, that we acquire our knowledge of its magnitude and figure; and as this problem has engaged the attention of mathematicians and aſtronomers in all ages, and is, beſides, one of the moſt important and intereſting in practical geometry, we ſhall enter into all the details relating to it at conſiderable length, and endeavour to trace its hiſtory from the earlieſt times to the preſent day.

There is every reaſon to believe that the ſolution of this problem was attempted at a very remote period of antiquity. And if it be allowed to ſupply the ſilence of hiſtory by conjecture, we may preſume that an attentive conſideration of the ſame phenomena that firſt indicated the ſpherical figure of the earth, ſuggeſted the idea that its whole magnitude might be aſcertained by the meaſure of a ſmall portion of its ſurface.

The firſt attempts to accompliſh this purpoſe were, doubtleſs, very rude and inaccurate; but it is evident, that a great and unexpected ſtep was made in the progreſs of human knowledge, the moment a juſt conception of this theory was obtained.

It is in vain that we now inquire at what period this diſcovery was made; we know with what myſterious ſecrecy the learned in thoſe early ages veiled their knowledge from the vulgar, either becauſe their opinions were too much at variance with the prejudices of the ignorant to have been communicated with ſafety, or, what is equally probable, the temporal advantages they derived from this reſerve were too conſiderable to be hazarded by an indiſcreet diſcloſure of their ſecrets, which would have reduced them nearer to the level of ordinary men.

To what accuracy the ancients really did attain in their endeavours to meaſure the magnitude of the earth, is a diſputed queſtion among the learned to this day.

Bailly, indulging in his favourite theory, ſtrives to perſuade us that traditionary meaſures muſt have been tranſmitted from the antediluvian world, which were thoſe of the aſtronomers of the early ages; and that theſe being very preciſe aliquot parts of a degree, were neceſſarily founded on an accurate meaſure of a portion of the earth's circumference. It is not our deſign to enter into this controverſy, or to treat with diſreſpect the opinions of a man whoſe talents were ſo deſervedly celebrated, and whoſe fate is ſo juſtly deplored. We ſhall content ourſelves with obſerving, that we can meet with nothing on this ſubject ſufficiently authentic to merit the attention of the reader, previouſly to the eſtabliſhment of the Alexandrian ſchool, about 300 years before the Chriſtian era.

The firſt meaſurement we find upon record, to which tradition has affixed the name of an individual, is that of Eratoſthenes of Alexandria, the ſucceſſor of Ariſtarchus. We regret that a more detailed account of this celebrated operation has not been tranſmitted to us.

It appears that Eratoſthenes determined the difference of latitude between Syene and Alexandria in Egypt to be 7° 12′; and this diſtance having been previouſly meaſured (as is ſaid) by the royal ſurveyors of Alexandria to be 5000 ſtadia, he concluded the circumference of the earth to be 250.000 ſtadia.

The length of this ſtadium is not exactly known. Some of the learned men who accompanied the French expedition into Egypt, have, by means of an ancient nilometer found in the ruins of Elephantis, eſtabliſhed with great preciſion the relation which the ancient Egyptian cubit bears to our modern meaſures; and they have endeavoured, with great ingenuity, to deduce the exact dimenſion of the ſtadium from the ſame data. If they are correct, we ſhould infer, that the degree meaſured by Eratoſthenes did not differ from the truth above one thouſandth part of the whole. We believe that every perſon, who has any practical knowledge of the difficulties attending an operation of this kind, will require very little argument to be convinced, that if ſuch a remarkable coincidence does really exiſt, it muſt be attributed to the effect of accident alone. For the latitude of Syene was only determined by obſerving, that a deep well received the vertical rays of the ſun on the day of the ſummer ſolſtice, without any perceptible ſhadow. The latitude of Alexandria might, perhaps, be determined ſomewhat more correctly. But the amplitude of the whole arc could ſcarcely be eſtimated to within 10′ of the truth; ſuch an error alone would produce a correſponding one of above 1000 toiſes in the value of the degree.

Of the trigonometrical meaſurement we know ſtill leſs. It would certainly be a very favourable ſuppoſition, to admit it true to the one-hundredth part of the whole; and to this, likewiſe, muſt be added the uncertainty in determining the direction of one place, relative to the meridian of the other. All theſe circumſtances conſidered, we muſt allow, that if the reſult did not differ from the truth more than one-fiftieth of the whole, it muſt have been by a very fortunate compenſation of errors.

Poſſidonius is the next aſtronomer whoſe name we find connected with this ſubject. He was a native of Apamea, in Syria, from whence he removed to Rome. He is ſaid to have determined an arc of the meridian, and to have eſtimated the circumference of the earth at 240,000 ſtadia. The ſilence of cotemporary writers relative to the details neceſſary

neceſſary to an operation of this kind, renders it probable that the determination of Poſſidonius was only founded on an inveſtigation of the labours of others. His data were neceſſarily extremely vague, ſuch as the diſtances of different places computed by navigators, and their latitudes probably determined in a moſt inaccurate manner; ſo that the obſervation we made on the degree of Eratoſthenes applies, with equal propriety, to that of Poſſidonius: and really theſe meaſures would ſcarcely deſerve the notice of men of ſcience, but for the importance which ſome learned men have attached to them.

Ptolemy, who lived near 300 years after Eratoſthenes, conſiders the circumference of the earth as equal to 180,000 ſtadia. It has been conjectured, that this meaſure is identical with that of Poſſidonius of 240,000, a different ſtadium being referred to by each of them. This opinion is the more admiſſible, as we know that the Egyptian cubit has been divided at different times into 32 and 24 digits. It is poſſible, therefore, that the ſtadium ſuppoſed to be derived from the cubit, might, likewiſe, be liable to the ſame proportional variation.

During a long dark period of nearly 1400 years, but one ſolitary inſtance occurs of any attempt either to verify or improve theſe ancient meaſures. About the year 814 the caliph Almamon, the ſon of Haroun al Raſchid, aſſembled his aſtronomers on the plains of Meſopotamia, and ordered one party to travel north and the other ſouth, till they had changed the ſituation of their zenith one degree from the place of their departure. We neither know how they determined their latitude, nor how they meaſured their diſtance.

The degree reſulting from this meaſurement is reported to have been eſtimated at 56 miles and a half; but ſo great is the uncertainty relative to the ſtandard employed, that this meaſurement, like many others, may be conſidered as loſt to poſterity.

In the year 1528, Fernel undertook to meaſure the length of a degree, and aſcertained the diſtance between Paris and Amiens by counting the revolutions of the wheel of a carriage. He eſtimated the degree at about 68,096 geometric paces. Here is, likewiſe, ſome uncertainty as to the value of theſe geometric paces.

Picard eſtimates Fernel's degree at 57,070 toiſes, Riccioli at 62,706.

Thus, the labour of this meaſurement is likewiſe loſt, from the circumſtance of ſeveral meaſures exiſting in the ſame country of one denomination. We have not much to regret, perhaps, in this particular caſe, but had the operation been ever ſo exact, we ſhould equally have been deprived of the advantage of it. Nevertheleſs, M. de la Lande thinks Fernel's meaſure pretty well known, and conſiders it as accurate, which muſt have been accidental, conſidering the imperfect nature of this method. He determined the latitude of his extreme ſtations by taking the altitude of the ſun with parallactic rules ſimilar to thoſe of Ptolemy of eight feet radius.

Snellius, in the year 1617, meaſured a portion of the meridian between Alknaar and Bergenopzoom: his method was in its principle perfectly correct. He meaſured a baſe, and deduced the diſtance of two extreme ſtations by a ſeries of triangles, obſerving the latitude of each of them. He failed in computing the degree very exactly, which, in ſome meaſure, aroſe from his having taken too ſhort a baſe, only 631 toiſes; and, likewiſe, from not being provided with inſtruments ſufficiently accurate for the purpoſe.

Norwood, a native of this country, in the year 1635, meaſured the arc of the meridian, contained between London and York, with conſiderable care.

He determined the altitude of the ſun on the day of the ſolſtice, in two different years, at each place, and found the difference of latitude 2° 28′; he meaſured the diſtances by chains, ſometimes by paces, eſtimating, as well as he could, the various windings in the direction of the road, and found the degree to contain 367,196 Engliſh feet, or 57,300 toiſes. This meaſurement of Norwood ſeems entitled to more reſpect than it obtained: it had at leaſt the merit of being more exact than any that preceded it.

We ought not in this place to omit the meaſurement of Riccioli, founded on a method firſt ſuggeſted by Kepler, which conſiſts in obſerving the depreſſion of two diſtant objects below the horizon. It may be inferred, from the property of the ſphere, that the ſum of the depreſſion of two diſtant objects is equal to the arc intercepted between them. This may be eaſily underſtood by referring to *Plate* VI. *fig.* 48. A and B are two ſtations, ſufficiently elevated for either to be viſible to a ſpectator placed at the other: A *c*, B *c*, the reſpective horizons. In the trapezium A *c* B C, A and B being right angles, the angles C and *c* are together equal to two right angles. Therefore, the angle *c* A B, and *c* B A, or the ſum of the depreſſions, is equal to the angle C. Riccioli meaſured the angle A B C on the mountain of Paterno, near Bologna, formed by the perpendicular B C, and the tower of Modena. He then obſerved the angle C A B at the tower of Modena, which the perpendicular A C made with a ſignal on the tower of Paterno to be 90° 15′ 7″. The ſum of theſe two angles, 179° 41′ 20″, being taken from 180°, leaves 18′ 40″ for the angle A C B.

He then meaſured the included diſtance, and found it equal to 20,016 paces of Bologna: from theſe data the value of a degree might be calculated by a ſimple proportion. Riccioli appears to have taken a great deal of pains with this method, which, however, is very defective in practice, both from the uncertainty of the terreſtrial refractions, and likewiſe from the ſmallneſs of the included arc. And, therefore, it is not ſurpriſing that the reſult was inaccurate: he made the degree 63,000 toiſes, which is not within one-tenth of the truth.

Such was the ſtate of uncertainty, relative to this intereſting problem, till the eſtabliſhment of the academy of ſciences in France. One of the firſt operations of that learned body was the determination of the magnitude of the earth; and Picard was entruſted with the execution of the project. But, to enable the reader to underſtand the different operations that ſucceeded theſe imperfect eſſays, it may be proper to ſtate the nature of the problem a little more diſtinctly, and to give a general outline of the principle on which its ſolution is founded.

Fig. 49. Let A and B be two places nearly north and ſouth of each other. M N, a meridian paſſing through A. B x, a perpendicular from the ſtation B, falling on the meridian M N. The object is to determine the difference of latitude between A and x; to aſcertain the diſtance between them in terms of ſome known ſtandard meaſure; and then, by a ſimple proportion, to find the value of a degree. Thus, if the difference of latitude between A and x ſhould be found to be 40′, and its meaſured diſtance 40,000 fathoms, we ſhould ſay, 40′ : 40,000 fath. :: 60′ or 1° : 60,000 fath. = the meaſure of a degree.

For this purpoſe, the moſt uſual method is to meaſure a baſe line, as *a b*, with all imaginable care: a number of intermediate ſtations are then to be ſelected, as conveniently ſituated for the purpoſe as poſſible. Theſe conſiſt of ſuch ſteeples, towers, or other conſpicuous objects as are to be met

met with; and when these are wanting, signals erected to supply their place. By means of these stations, a series of triangles are formed, by which A and B are connected with each other, and with the base line ab, as in *fig.* 49. The respective angles of these triangles are then accurately measured with a theodolite, and as the base line forms one side of one triangle, all the others may be found by a trigonometrical calculation. When the base line is situated near one extremity of the arc, it is not unusual to measure a base of verification near the other extremity, and to compare its length by actual measurement with that deduced by computation by means of the intervening triangles. This is an excellent test of the accuracy of the trigonometrical process.

The base being measured, and the sides and angles of the triangles determined, two more operations, entirely astronomical, are requisite to complete the process. The difference of latitude of the extreme stations must be determined with the greatest precision, and likewise the direction which one of the sides of the first triangle makes with the meridian M N. Sufficient data are now obtained for finding the perpendicular distance of each station from the meridian M N; as pp', qq', rr', and B x; and also the distance of each perpendicular from A, as A p', A q', A r', and A x. A x and B x being thus obtained, the distance and bearing of B may be found by the rules of plane trigonometry. The latitude of the other point x, which is used in finding the amplitude of the arc A x, is deduced from the observed latitude of B. It is true, that this can only be done rigorously by a spherical calculation, the small arc B x, found in toises or feet, being converted into minutes and seconds of a degree. To do this, we must suppose known the very thing we are in search of, that is, the relation the degree bears to our standard measures. But as the arc B x is always taken very small, compared with A x, no practical inconvenience is found to arise from this approximation.

It appears then, that the whole process consists of four distinct operations; the measurement of a base; the determination of the angles of a series of triangles, so constructed, as to connect the extreme stations, both with the base and with each other; the determination of the latitudes, or, at least, the difference of latitude of the extreme stations; and, lastly, the relative bearing of one station with the meridian of the other.

From the varied and uneven nature of the surface of the earth, several complicated considerations arise in practice, that have been entirely omitted in the preceding description. For, as these stations are taken in an extended range of country, it must necessarily happen that they will be very unequally elevated or depressed above one common level. So that, if we suppose triangles to be formed by lines joining their summits, these will produce a most irregular figure; no two triangles, probably, lying in the same plane. Before the requisite calculations can be made, these stations must all be reduced to the level of one uniform spherical surface (which surface is usually supposed to be the level of the sea). *Fig.* 50. is intended to illustrate the nature of these reductions. A, B, C, D, E, are the elevated signals; a, b, c, d, e, their places reduced for computation. To have an accurate idea of this reduction, we may suppose lines drawn from the centre of the globe to the vertices of the stations: the points formed by the intersection of these lines with the imaginary spherical surface, every where level with the sea, are those which are to be used in the subsequent calculation.

The triangles formed by these points may either be considered as plane or spherical: in one case, their sides are chords passing through the earth; in the other, curved lines drawn over its surface.

We may here likewise explain the principle of another method, which hereafter we shall have occasion to describe more at length; this is the determination of the value of an arc oblique or perpendicular to the meridian, by means of azimuthal angles, by which the direction of the meridian with the adjoining station is ascertained.

Let P (*fig.* 51.) be the pole of the earth, A any place whose latitude is known, B a station visible from A; an observer at A determines the azimuthal angle P A B, the angle P B A is likewise observed at the station B, and the distance between A and B measured trigonometrically; then in the triangle P A B, P A is known, being equal to the co-latitude of the place; and the two angles being known, the side A B may be found; and thus the value of a degree, or an oblique circle, obtained. If A p be drawn perpendicular to A P, then in the triangle A B p the two angles p A B and p B A are given, as likewise the side A B, as found above. By these we may find the value of A p, which is a portion of the great circle perpendicular to the meridian. And this arc A p may be always known in linear measure, by the rules of plane trigonometry.

It is evident that on a sphere all these degrees should be equal.

We may now return to the historical part of our subject, and resume the narrative of the operations of Picard, who, as was before stated, was entrusted with the measurement of a degree between Paris and Amiens. (A. D. 1699.)

In *Plate* VI. *fig.* 52, may be seen the general disposition of Picard's triangles. The angles were measured with a quadrant of three feet radius, furnished with two telescopes, the one fixed, the other moveable.

He began his operation by measuring the distance between Villejuive and Juvesy, which places being nearly joined by an even paved road, were thought most eligible for his purpose: he found this distance to be 5863 toises.

Beginning at Juvesy, he measured the angle which a mill at Villejuive, that terminated his base, made with the steeple at Brie. The angle made by the two telescopes was 95° 4′ 55″. He then carried the instrument to Villejuive, and there directing one telescope of the quadrant to a signal at Juvesy (which formed the other extremity of his base), and the other to the steeple at Brie, he found the angle subtended by these two objects to be 54° 4′ 35″. With these two angles, and the included side, it was easy to deduce the distance from Villejuive to Brie, = 11,012.8 toises. This measure was verified by taking the instrument to Brie, and observing the third angle of the triangle, which appeared by observation to be the same as it should have been by computation from the other two. The distance thus found by the first triangle served as a base to the next, whose vertex was the celebrated tower of Montlhery. The angles at Villejuive and Brie being 77° 25′ 50″, and 47.34 respectively, the distance from Brie to Montlhery was deduced 13,121 toises. This distance was found, by a more careful measurement in the year 1756, to be 13,108. The third and fourth triangles were both formed on this base; one was limited on the north by the tower of Montjay, the other on the south by the flag staff of Malvoisine. These gave the distances from Montlhery to Malvoisine 8870½ toises, and Montlhery from Montjay, 21,658. The fifth triangle, founded on this base, terminated at Mareuil. From these triangles the distance from Malvoisine to Mareuil was calculated to be 31 897.

Having determined this great triangle by means of the subordinate ones, he was desirous of verifying it by direct measure-

meafurement, and for this purpofe procured large fires to be lighted, of three feet diameter. When viewed through the telefcope of the quadrant, thefe are faid to have refembled in appearance ftars of the third magnitude: they feemed however to fubtend an angle of 8″ inftead of 3″ or 4″, which they fhould have done by calculation; from which it was inferred that luminous bodies fometimes appear larger than they really are. By proceeding in this manner, he found, by means of 13 triangles, the diftance from Malvoifine to Sourden, near Amiens, to be 68,430½ toifes, and with a zenith fector of 10 feet radius, he found the difference of latitude to be 1° 11′ 57″.

By obferving the azimuth of the pole-ftar at its greateft digreffion at Mareuil, he determined the direction which the fides of his triangles made with the meridian; and drawing perpendiculars from the ftations to the meridian, he was enabled to complete the intercepted portions.

From thefe data he concluded a degree in the latitude 49° 7′ to be 57,060 toifes. This refult differs very little from that deduced from later meafurements; yet this great precifion arofe, in fome degree, from a compenfation of errors.

In 1756 two pyramids were erected at the extremities of the bafe, at Villejuive and Juvefy, at the exact diftance of 5786 toifes, when, upon a re-examination of Picard's operation, his diftances were found to be too great by one toife in a thoufand, either becaufe his meafure was not identical with that fubfequently ufed, or that his bafe had not been determined with fufficient precifion.

The fuccefs that attended Picard's meafurement, and the accuracy that trigonometrical operations were found to poffefs, determined the academy to extend his triangles ftill farther in the direction of the meridian both to the north and fouth.

This was partly carried into execution by Dominique Caffini, in the year 1683. He affumed as a bafe the diftance between Montlhery and Brie, as determined by Picard, and had completed a chain of twenty principal triangles, to a ftation 60 leagues fouth of Paris, when the death of Colbert, the great patron of fcience, for a time interrupted thefe purfuits.

It was not till the year 1700 that they refumed their labours. Caffini, affifted by his fon Jaques Caffini, and Maraldi his nephew, continued the feries of triangles as far as the neighbourhood of Perpignan, above 6° fouth of the obfervatory of Paris.

They traced a bafe of verification 7246 toifes, a little to the eaftward of Perpignan, the length of which, by direct meafurement, was found to agree very exactly with that deduced by calculation from the triangles.

The northern part of the arc from Paris to Dunkirk was not terminated till the year 1718. The aftronomers employed on this occafion were Jaques Caffini, Maraldi, and De la Hire. They likewife meafured a bafe of verification in the vicinity of Dunkirk. When the refult of thefe operations was examined, the fouthern degree was found equal to 57,097 toifes, and the northern 56,960. It was thus that, after a period of 30 years from its commencement, this great work was brought to a termination.

The refult, as far as it related to the relative magnitude of different degrees, was certainly erroneous; but this we cannot be furprifed at, when we recollect the imperfect ftate of aftronomical inftruments at that period; but by thefe operations the foundation for the improvement of the fcience of geography was laid. The advantage of combining aftronomical and trigonometrical obfervations was diftinctly perceived, and the project formed of extending thefe triangles over the whole fuperficies of the kingdom.

But the above mentioned operations began to derive an additional intereft, from a queftion of great importance that about that time engaged the attention of the fcientific world; this was the determination of the *true* figure of the earth. Hitherto we have confidered the meafure of a degree as the only requifite ftep for determining the earth's magnitude, upon the fuppofition of its being perfectly fpherical; in which cafe, all the degrees of latitude being equal, it is evident that the meafure of one would have afforded fufficient data for eftimating the value of the whole circumference.

But the difcoveries of Huygens and Newton, about this time, rendered it more than probable that the equatorial parts of the earth muft at fome period of its exiftence have yielded to the centrifugal force acting on them in confequence of the diurnal motion, in fuch a manner, as to have given to the globe an oblate form, fuch as we may conceive produced by the revolution of an ellipfe about its fhorter axis. If this theory be juft, the degrees fhould increafe in proportion as we recede from the equator, and approach the poles.

For we define a degree of the meridian to be that fpace which we muft pafs over (in moving directly north or fouth), to produce a change in the vertical line equal to that quantity. We have feen above, that the degrees meafured in France indicated a contrary tendency; and we cannot wonder that thofe, who had beftowed fo much pains in an operation which, if exactly performed, fhould have folved the problem at once, fhould be unwilling to fee their labours overturned by a hypothetical calculation. Men of fcience were very much divided on this queftion; the arguments derived from theory were certainly very ftrong in favour of the flattened figure at the poles; on the other hand, it had fo happened, that the beft known meafures at that time, indicated that the polar axis was the longeft. Caffini propofed meafuring trigonometrically a degree of longitude, or, what was ftill preferable, a degree of a great circle perpendicular to the meridian. This fcheme was adopted and carried into effect; and it fo happened, that the refult likewife of this experiment rather favoured the idea that the polar axis was the longeft. We know now that this operation is of a more delicate nature, and attended with greater practical difficulties, than the meafurement of an arc of the meridian. But though thefe trigonometrical meafurements were infufficient to clear up the doubt that exifted relative to a difficult point in the theory of the earth; yet the addition made to geographical fcience was very great: for an arc perpendicular to the meridian was meafured from the weftern coaft to Strafburg; and, as we have before mentioned, thefe triangles being afterwards extended over the whole kingdom, gave to the geography of that country a precifion unknown in any other part of the world.

The trigonometrical meafurement, even at that period, was very correct; the errors were occafioned chiefly by want of accuracy in the aftronomical part of the procefs.

Caffini de Thury, who was engaged at a fubfequent period in continuing thefe operations, had fo much confidence in his trigonometrical operations, that, having met with an aftronomer in the range of his triangles who congratulated him on their accuracy, becaufe they agreed with his obfervations: rather, replied Caffini, let me offer you my compliments on the correctnefs of your obfervations, fince they are fo fortunate as to agree with my triangles.

It was in the year 1733 that Condamine reprefented to the academy, that the beft way of arriving at the truth, amidft fuch a variety of opinions, would be to procure a meafure of the degree at, or very near, the equator, and he offered himfelf to fhare the difficulties and celebrity of the enterprife.

The following year Godin read a memoir to the fame effect, accompanied by the fame offer. It was not long before the king's confent was obtained; and paffports having been procured from the court of Spain, Condamine, Godin, and Bouguer embarked on this celebrated expedition at Rochelle, on the 16th of May, 1735.

No fooner had this expedition left France than M. Maupertuis reprefented to the minifter, the count de Maurepas, that a ftill greater certainty would be obtained by meafuring another degree, as near as poffible to the pole. In confequence of this, the academy received an order from the king to choofe fuch perfons as they fhould think moft proper, to carry this defign into execution. The academicians appointed to make this celebrated voyage were Maupertuis, Clairault, and Monier; to thefe were added the Abbe Outhier, who poffeffed confiderable fkill in aftronomical obfervations. They left France in the year 1736, and arrived at Tornea, a town fituated at the northern extremity of the gulf of Bothnia, about the beginning of fummer. The country deftined to be the fcene of this important operation is ftrange and inhofpitable beyond defcription; and the entrance of fcience into thefe dreary abodes, almoft on the confines of the world, forms a contraft fo ftriking, as to excite the moft lively intereft in the difficulties they had to encounter; nor do we think the reader will be difpleafed to find their narrative, and defcription of the country, blended with the fcientific account of their proceedings.

Their firft defign was to eftablifh their fignals on the coaft of the gulf of Bothnia; but this, from local circumftances, was found impracticable. Fortunately, by following the courfe of the river Tornei, which runs nearly north and fouth, the mountains on each fide were found to afford many diftant points of view, well adapted for the erection of their fignals.

They fet off from Tornea on the 6th of July, and began their journey by failing up the great river, which, rifing in the middle of Lapland, purfues its courfe to the gulf of Bothnia. From that day forward, their only habitation was the deferts, and the fummits of the mountains, which were to form their triangles.

They afcended thefe with great difficulty, and erected on their tops fignals, compofed of large trees ftript of their bark, and formed into hollow cones, which, from their whitenefs, were vifible at 10 or 12 leagues diftance.

The months of July and Auguft were fpent in exploring thefe mountains, erecting fignals, determining the angles of the triangles, and choofing a proper place for their bafe, the meafurement of which they thought better to defer till all the other obfervations were finifhed, which the approach of winter might have rendered impracticable. By referring to the map, *Plate* VI. *fig.* 53, it will be feen, that their triangles formed a heptagon. Kittis and Tornea were the extreme ftations. Near the middle of the heptagon was placed the bafe line, having the advantage of a perfectly fmooth level, as it was to be meafured on the river itfelf as foon as the feverity of the cold fhould have frozen its furface.

The angles of their triangles were meafured on a quadrant of two feet radius, the centre being placed in the centre of the ftation; the elevation or depreffion of the adjoining fignals was likewife obferved, by which they could reduce the angles to the plane of the horizon.

The aftronomical obfervations were finifhed at Kittis by the latter end of September. The zenith diftance of δ draconis was obferved with a zenith fector of nine feet radius, conftructed in London by Graham; and the direction of the meridian with the fignal at Pullingi was found, by obferving the precife moment of time when the fun paffed the vertical. For this purpofe they had a fmall moveable tranfit inftrument, the telefcope of which was 15 inches. The axis of this being levelled, and the fignal bifected, they obferved the time by the clock, when the fun's centre paffed the vertical wire of the telefcope; by calculating the azimuth of the fun anfwering to the time of obfervation, the direction of Pullingi with the meridian line was found to be 28° 51′ 52″.

Having completed all that was neceffary to be done at Kittis, they loft no time in removing to Tornea, where they arrived the end of October. Here the fame obfervations were repeated as had been at Kittis. The zenith diftances of the fame ftar was obferved, and the direction of the meridian eftimated by the fame method, as defcribed above, differed about 30″ from the determination at Kittis.

The angles of the triangles, the amplitude of the arc, and the direction of the meridian being determined, nothing now remained but to meafure the bafe. As this operation was conducted under peculiar difficulties, we fhall give the account of it, as related by M. Maupertuis himfelf. "On Friday the 21ft of December, the day of the winter folftice, and a very remarkable one for fuch an enterprife, we began the meafure of our bafe towards Avafaxa, where it lay. In this feafon the fun but juft appeared above the horizon at noon; but the long twilight, the whitenefs of the fnow, and the meteors that are continually blazing in the fky, afforded us light enough to work four or five hours every day.

"At eleven in the forenoon we left the curate's houfe, where we had taken up our abode till this operation fhould be finifhed, and went upon the river to begin our furvey, attended by fo many fledges, and fo great an equipage, that the Laplanders, attracted by the novelty of the fight, came down from the neighbouring mountains. We feparated into two bands, each of which carried four of the rods juft mentioned. I fhall fay little of the fatigues and dangers of this procefs. Judge what it muft be to walk in fnow two feet deep, with heavy poles in our hands, which were continually to be laid on the fnow and lifted up again, in a cold fo extreme, that whenever we wifhed to tafte a little brandy, the only thing that could be kept liquid, our tongues and lips froze to the cup, and came away bloody:—In a cold that congealed the fingers of fome of us, and threatened us with yet more difmal accidents. While the extremities of our bodies were thus freezing, the reft, through exceffive toil, was bathed in perfpiration; brandy did not quench our thirft, and therefore we were obliged to have recourfe to deep wells through the ice, which were fhut almoft as foon as opened, and from which the water could fcarcely be conveyed unfrozen to our lips, and thus run the hazard of the dangerous contraft which iced water muft produce in our heated bodies."

The feverity of the climate, as above related, did not prevent them from completing the meafurement of their bafe, with greater exactnefs than they had dared to hope for. They made ufe of eight deal rods, of 20 feet each in length; and their party, as above mentioned, being divided into two companies, taking four of thefe rods, each meafured the fame bafe, independently of the other. In the whole meafurement of 7406 toifes, only four inches difference was found between the two meafures. The whole party now retreated to Tornea, where they fpent the winter. Here they applied the meafure of their bafe to their triangles, and found the arc, included between the parallels of Kittis and Tornea, to be 55,023½ toifes, its amplitude being 57° 27′. This was nearly 1000 toifes greater than it fhould have been, according to the theory of Caffini.

"The town of Tornea, at our arrival, on the 30th of December, had really a moft frightful afpect. Its houfes were buried to the tops in fnow, which, if there had been any day-

 light,

light, would have effectually shut it out; but the snow continually falling, or ready to fall, commonly hid the sun for the few moments that he might have been visible at noon-day. In the month of January the cold was increased to that extremity, that Mr. Reaumur's mercurial thermometers, which at Paris, in the great frost, 1709, it was thought wonderful to see fall 14 degrees below the freezing point, were now got down to 37. The spirit of wine in the others was frozen. If we opened the door of a warm room, the external air instantly converted all the vapour in it to snow, whirling it round in white vortices. If we went abroad, we felt as if the air was tearing our breasts in pieces, and the crackling of the wood of which our houses were made, as the violence of the frost split it, continually alarmed us with an approaching increase of cold. The solitude of the streets was no less than if the inhabitants had been all dead; and in this country you may often see people that have been maimed, and had an arm or a leg frozen off. The cold, which is at all times very great, increases sometimes by such sudden and violent fits, as almost infallibly to be fatal to those who happen to be exposed to it. Sometimes there rise sudden tempests of snow that are still more dangerous. The winds seem to blow from all quarters at once, and drive about the snow with such fury, that in a moment all the roads are lost. Unhappy he who is surprised by such a storm in the fields; his acquaintance with the country, or the marks he may have taken by the trees, cannot avail him; he is blinded by the snow, and lost if he stirs but a step."

Though they had no reason to doubt the accuracy of their observations, yet that their truth might not be called in question, they agreed on the return of spring to repeat the astronomical observations at Tornea and Kittis. δ Draconis was the star which had been observed the preceding autumn for determining the amplitude of the arc. They now fixed on α in the same constellation; and it was observed during the months of March and April, at both the stations, as δ had been before. They now found the amplitude $57' \, 30\frac{1}{2}''$, which only exceeds the former determination $3\frac{1}{2}''$, Tornea not being exactly on the same meridian line as Kittis, but 31,495 toises to the eastward, a correction of 3.48 toises was applied to the mean amplitude, and the degree ultimately determined at 57,438 toises. Some minute corrections for refractions having been made by later astronomers, the degree of Maupertuis is usually estimated at 57,420 toises. Notwithstanding the diligent attention that was bestowed by these astronomers on every part of the process, later and more exact observations have shewn, that their observations were affected with some considerable error. It is conjectured that the inaccuracy originated in the zenith observations with the sector. The degree, as determined above, is too long by above 200 toises, according to the late measurement of the Swedish astronomers. This corresponds to an error of $10''$ in the amplitude of the arc. This quantity exceeds what we should have thought probable, and unfortunately it was found that Maupertuis had not described his station with sufficient precision, to enable those who wished to verify his operations, to repeat the observation on the identical points that had been formerly chosen by the French astronomers.

We have now to return to the southern expedition, which, as we have already stated, sailed from France in the summer of the year 1735. After making some stay at St. Domingo, they proceeded by way of Carthagena to Porto Bello, crossed the isthmus which separates the two continents, and embarking at Panama, arrived at Manta on the coast of Peru, in the month of March, 1736. At this place the party separated, and afterwards arrived by different routes at Quito. They had been joined at Carthagena by Don George Juan, and Don Antonia Ulloa, marine officers in the Spanish service, who were ordered by the king of Spain to facilitate the labours of the French academicians by all the assistance in their power to give. The difficulties which presented themselves on the first survey of the country were even more formidable than those which had occurred in the expedition to the north. The summits of the lofty mountains on each side the plains of Quito are not only covered with perpetual snow, but almost always obscured by mist or clouds. Nothing but the most ardent zeal for the success of their enterprize could have enabled them to have persevered in so unpromising a task. Success was not absolutely impossible, and this was thought sufficient encouragement to persevere. It was often necessary to wait for weeks at a station to get a favourable opportunity of viewing the surrounding country; and when this occurred, they found perhaps that their signals had disappeared, either overturned by the violence of the hurricanes, or stolen by the neighbouring Indians. The Spanish government did not seem disposed to render them such efficacious assistances as they were entitled to expect from the nature of their mission, and we perceive with regret from their respective accounts, that there was a want of that union and cordiality among themselves so necessary to enable them to prosecute with cheerfulness so laborious an undertaking.

With these difficulties and vexations, they struggled eight years before their operations were completed; and it was nearly ten years after their departure from France, before they returned with the fruit of their labour.

We shall now give, as briefly as possible, an outline of their operations.

When they arrived at Quito, their first care was to select a spot for the measurement of a base, and they were rather fortunate on meeting with a tolerably level situation, in a plain called Yarouki in New Quito. The party divided into two, Godin with Don George Juan, and Bouguer with Condamine. These each measured the base 6272 toises, and the difference of the measures did not exceed two inches.

Some difficulties occurred in measuring the base, but they were nothing compared to those they encountered in constructing the triangles. The whole country consisting of mountains, some covered with perpetual ice, others, less lofty, almost constantly enveloped in snow and mist. This operation was not completed for two years: Godin and Don Juan finished their triangles at Cuença, but afterwards prolonged them to Pueblo veijo de Mira, about $\frac{1}{2}$ a degree to the south, the whole arc being near $3°\frac{1}{2}$.

The arc measured by Condamine and Bouguer was not quite so long; it extended by the medium of 32 triangles from the equinoctial line beyond the third degree of south latitude. The extreme stations were Cotchesqui on the north, and Tarqui on the south. A base of verification was measured at the southern extremity of 5259 toises, which agreed within a toise of its calculated length. The measure of Godin and the Spanish officers was put to the same test by a similar verification of a base measured on the plain of Cuença.

The rest of the operation was likewise conducted by separate parties. Bouguer and Condamine having finished their trigonometrical measurements, commenced their observations for determining the amplitude of the arc. Their efforts to obtain a satisfactory coincidence were for a long time ineffectual. Their sector of 12 feet radius met with frequent derangements, and the length of time necessary for its removal from one extreme station to the other rendered the observations very discordant; for at that time the theory

theory of aberration and nutation was not known. Their ſector proving defective, they were obliged to alter its conſtruction, and after much loſs of time, they adopted the expedient of conſtructing a new one, and obſerving at the ſame time at each ſtation. They now began to have greater confidence in their operations, and by repeated obſervations of the diſtance of ε Orionis, obſerved at Tarqui and Cotcheſqui, they determined the intercepted arc to be 3° 7′ 1″, and the meaſure of a degree 56,750 toiſes. Godin and the Spaniſh officers undertook likewiſe on their part a ſeries of ſeparate obſervations, to determine the amplitude of the arc between Mora and Cuença. But the latter, being ordered on profeſſional duty, quitted the party for a period of two years, during which Godin continued to obſerve alone. When the Spaniſh officers returned, they completed their operations, ſo that, in fact, there were three determinations obtained depending very little on each other; the latter determination gave the amplitude between Mora and Cuença 3° 36′ 52″, and the degree 56,768 toiſes.

Bouguer ſet off firſt on his return to Europe; he followed nearly the ſame route by which he went, and arrived in France, June 1744. He publiſhed a very full and detailed account of his operations in one large quarto volume, "La figure de la Terre:" a book containing many valuable diſquiſitions, both aſtronomical and phyſical, with a learned inveſtigation of ſeveral problems relative to the figure of the earth.

Condamine purſued his journey to Europe over a large tract of country, almoſt unknown. He traverſed the whole of the continent of South America, deſcending the river of the Amazons, to the Portugueſe ſettlements. He was thus enabled to contribute moſt uſefully to our geographical knowledge of that country, of which the moſt imperfect and fabulous accounts only had been publiſhed. He arrived in France in the year 1745. Beſides various memoirs preſented to the academy, and which are to be ſeen in their memoirs, he publiſhed in three volumes, quarto, a very full account of every circumſtance that had taken place, not only relating to the great work in which he had been engaged, but alſo his own adventures, and obſervations on the nature of the country, and its inhabitants, climate, natural hiſtory, &c. His work is divided into two parts; one, "Introduction Hiſtorique," containing the hiſtorical part of this intereſting voyage, written in a moſt pleaſing and animated ſtyle; the other, "Meſure des trois premiers Degrees du Meridien," is dedicated to the obſervations immediately relative to the object of the expedition.

The two Spaniſh officers returned by the way of Cape Horn, and arrived in Spain in 1746. Don Antonia de Ulloa was taken by the Engliſh in his paſſage, and brought to London, where he was treated with all the reſpect due to his character as a man of ſcience. He was admitted a fellow of the royal ſociety, and all his papers were reſtored to him. On his return to Spain, in conjunction with Don Juan, he publiſhed an account of their voyage in three quarto volumes, which was afterwards tranſlated into French, and printed at Amſterdam, in two volumes, quarto. This work, like that of Condamine, is extremely intereſting, containing a great variety of amuſing matter, beſides the account of their own operations, relative to the meaſure of the meridian.

Godin, after having been detained by various occupations in Peru, till 1748, and witneſſing the dreadful cataſtrophe which deſtroyed the two cities of Callao and Lima, ſet off on his journey towards Europe. He traverſed the wide extended provinces of Peru, Tucuman, and Paraguay, and arrived at Buenos Ayres, from whence he returned to France through Portugal and Spain. The king of Spain, in whoſe ſervice he had held ſome employ during his reſidence in Peru, appointed him director of the royal marine academy at Cadiz. At this place he had the misfortune to loſe his ſight, which prevented him from giving any relation of his own, as the other academicians had done, which is much to be regretted, as he is ſaid to have poſſeſſed much valuable information. His brother Godin des Ordonnois accompanied him. He married whilſt in the country, and travelled to Paraguay, from which place he ſent to his wife to join him. She, with her brothers and family, were to traverſe the continent, as Condamine had done before, by the river of the Amazons. The whole party loſt themſelves in the immenſe deſerts of South America, and madam Godin, after ſeeing her brothers and moſt of her attendants periſh one by one with hunger and fatigue, arrived after a journey of unparallelled diſtreſs and danger ſafe at her deſtination. Her ſingular adventures are related in a ſmall work publiſhed by Condamine in 1773, entitled, "An Account of the Fate of the Academicians and their Aſſiſtants, who were employed in the Expedition to Peru."

Juſſieu, the botaniſt, having ſtaid ſome time after the departure of his companions, to increaſe his collection of plants, and other objects of natural hiſtory, returned to France, but publiſhed no ſeparate account of his voyage. Seniergue, their ſurgeon, was aſſaſſinated at Cuença, during the celebration of a bull feaſt.

Three different meaſures had now been obtained with great labour and difficulty at the equator, in the latitude 45°, and at the arctic circle, and no doubt any longer remained as to the oblate figure of the earth; it was univerſally admitted that the equatorial exceeded the polar axis by a conſiderable quantity, but the exact ratio between the two was very far from being accurately aſcertained. It became evident that ſome conſiderable error had been committed in the meaſurement formerly made in France. The aſtronomers who had returned from the northern expedition, conjointly with other members of the academy, undertook a re-examination of Picard's operations. They employed the ſame ſector as in Sweden, and by a careful compariſon of the zenith diſtances of ſeveral ſtars obſerved at Paris and Amiens, they found it neceſſary to correct the amplitude of the arc determined by Picard, by a quantity amounting to about 6″. But about the ſame time it was diſcovered, that an error exiſted in the baſe of Picard, of about one toiſe in a thouſand. This was ſuppoſed to ariſe from the non-identity of the meaſures, and not from want of care on the part of Picard. It ſo happened that theſe errors nearly compenſated each other, ſo that Picard's determination ſtill remains very near the truth. To diſcover the errors that were thought inevitably to exiſt in the great meridian between Perpignan and Dunkirk, it was reſolved to undertake this great work a ſecond time: it is the leſs neceſſary to enter into the details of this operation (known by the name of Le Meridien verifié), as it has been again re-meaſured within theſe few years paſt, with a degree of preciſion that would have appeared incredible to the aſtronomers formerly employed in the ſame operation. We ought, however, to mention that Caſſini de Thury and La Caille undertook a complete reviſal of all the former triangles, meaſured two new baſes, divided the arc into four parts of about $2°\frac{1}{2}$ each, and found that the degrees increaſed as they approached the north, but not according to any law that could be deduced from any probable theory. There were ſome other meaſures of a degree made about that period, that deſerve to be mentioned: La Caille, at the Cape of Good Hope, meaſured an arc of the meridian, and found the degree in latitude 33° 18′ ſouth = 57,037 toiſes. As La Caille was furniſhed with very imperfect inſtruments, we ſhall enter into no further detail of theſe operations, which

which are defcribed at large in the memoirs of the academy for 1751. About the fame period, Bofcovich, a learned Jefuit, and celebrated mathematician, meafured an arc of two degrees between Rimini and Rome, in latitude 43°, and found the degree = 56,973 toifes. The whole of this operation is minutely defcribed in a quarto book, publifhed at Rome in 1755, "De Litterariâ Expeditione per Pontificam Ditionem ad Dimetiendos duos Meridiani Gradus," &c.

A tranflation of this work appeared in 1770. It contains inveftigations of feveral problems relating to the figure of the earth.

Meffrs. Mafon and Dixon meafured a degree of the meridian in America, a full account of which is to be found in the Phil. Tranf. 1768. Their mode of meafurement differed from all others in this; that inftead of adopting the method of triangles, the whole fpace was actually meafured. From this meafurement the degree in latitude 39° 12′ appeared to be 56,888 toifes.

In 1777, Beccaria undertook a fimilar operation in the plains of Piedmont, the refult of which gave 57,024 toifes for the length of a degree, in latitude 44° 44′. Gradus Taurinenfis, quarto, 1774. Pere Liefganig, a Jefuit, meafured two degrees, one in Hungary, in lat. 45° 57′, which gave 56,881, the other in Auftria, lat. 48° 43′. 43 = 57,086.

The following account of the meafurement of a degree of latitude in China is taken from the German Mufeum, the 9th number, Auguft 1800.

"In the month of December 1702, father Anthony Thomas, a Jefuit, was ordered by the emperor Kanghy to meafure a degree of latitude. For that purpofe, a very extenfive plain was chofen, and the bufinefs of meafuring carried on in the prefence of all the mandarins of the mathematical tribunal, and even of one of the fons of the emperor, who wifhed to be an eye-witnefs of the operation. The refult was, that 1° 1′ 32″, the part of the meridian they meafured, comprehended exactly 200 Chinefe ftadia, at 360 geometrical paces each, confequently 1°, 70,206 paces. The proportion of the Chinefe foot to the old Roman foot, according to Villalpando, is ftated by the Jefuits to be 16 : 15; which makes 74,886 geometrical paces, as meafured by the Roman feet, and reduced to French toifes by the proportion of 1440 : 1315, gives 56987.9 toifes. This curious piece of geographical intelligence has been taken from a letter of father Cafparus Caftner, a German Jefuit, to father Francis Schuck, of the fame order, at Munich, dated Rome, January 10th, 1705, communicated to Major de Zach, at Gotha, as late as April 19, 1800, by Mr. Gabriel Knogler, profeffor at Ingolftadt. It is a pity that neither the degree of latitude, nor the method of meafuring, is pointed out in this communication. From circumftances, however, it may be inferred, that a meafurement, at which the whole mathematical court and the emperor's fon himfelf attended, was performed not far from Pekin. And as they had taken their meafures on an extenfive level ground, and proceeded as far as 200 ftadia, it may be concluded that the mode of menfuration they adopted was to meafure from one end to the other of a ftraight line, extended to that number of ftadia. If this, as it appears, has really been the cafe, it is aftonifhing how a method fo tirefome in its nature, and fo imperfect in its principles, could give a refult by which the meafurement in queftion may claim a rank among the moft exact operations of this kind, performed with better inftruments, and on more accurate principles."

When we confider how important it muft have been to the learned Jefuits at the court of Pekin, that no great error fhould be committed in this operation, we fhould not be fo much furprifed at the accuracy of the refult, which moft probably was very little connected with the correctnefs of the procefs.

We have omitted to mention the meafure of a degree of longitude, by Caffini and La Caille, in the latitude of 43°½.

One obferver placed on mount St. Victoire, near Aix, the other on a mountain near Cette, obferved feveral times the moment of explofion of 10lbs. of powder upon the church of St. Marie, a little village on the banks of the Rhone.

By a bafe meafured near Arles, they found the diftance 1° 55′ 19″ = 41,358 toifes. It would have been 260 toifes lefs on the fpherical hypothefis.

Notwithftanding thefe labours, great uncertainty ftill remained refpecting the true figure of the earth: the different meafures could by no means be made to agree with any probable hypothefis. The ellipticity refulting from thefe meafures varied from $\frac{1}{150}$ to $\frac{1}{300}$.

It feemed difficult to decide whether this difcordance arofe from irregularity in the figure of the earth, or from errors in the meafurement. We now know that both thefe caufes concurred to produce this difagreement. Later and more exact furveys have taught us that the plumb line is affected by great irregularities; and that the determination of the true figure of the earth by actual meafurement, is an operation of much greater difficulty than was at that time imagined.

Account of the trigonometrical Operations carried on in England.

Soon after the peace of 1783, a project was undertaken for connecting the obfervatories of Greenwich and Paris, which gave rife to the conftruction of two inftruments, fo greatly excelling any that had been previoufly ufed in geodetical operations, that they abfolutely form a new era in the fcience of trigonometrical furveying. One of thefe was the theodolite of Ramfden, the other the repeating circle of Borda. (For a particular defcription of each, fee THEODOLITE and CIRCLE.)

The great trigonometrical furvey of this kingdom originated in a great meafure from a memorial of Mr. Caffini de Thury, tranfmitted by the French ambaffador to Mr. Fox, then fecretary of ftate, fetting forth the advantage that aftromony would derive from conftructing a feries of triangles that fhould connect trigonometrically the two obfervatories of Greenwich and Paris, and thus determining their relative pofitions, more accurately than it was fuppofed could be done by aftronomical obfervation.

Both nations were at that time enjoying the bleffings of peace, and the learned men of each country readily obtained from their refpective governments, the affiftance and patronage which fuch an undertaking required. The execution of the plan on the Englifh fide of the channel was committed to the fuperintendance of general Roy, who had long been eminent in his profeffion as a fkilful engineer, and had been much engaged in purfuits of this kind, though on a fmaller fcale, chiefly with a view to his own amufement.

The firft confideration was to find an appropriate place for the meafurement of a bafe; and Hounflow-heath was felected for that purpofe, both from its great extent, and the evennefs of its furface.

On the 16th April, 1784, the prefident of the royal fociety, fir Jofeph Banks, accompanied by feveral others of its members, attended the firft examination of this place, and they had the fatisfaction to find that a ftraight line might be drawn with little difficulty from King's-Arbour on the N.W. extremity of the heath, to Hampton poor-houfe, on the S.E. extremity, a diftance of above five Englifh miles. It fo happened that this line coincided with a remarkable fpire feen at the diftance of 10 or 12 miles, known afterwards to belong to Banftead church. This object was of confiderable

ufe in clearing the bafe line, which was done by a party of foldiers, who removed the brufh wood and other inequalities of the foil, in a tract of about three yards in breadth.

Various methods were fuggefted, and tried for the meafurement of the bafe, as on the accuracy of this delicate operation all the fubfequent deductions would depend. Deal rods were firft employed, and afterwards abandoned, as they were found to be affected by the moifture and drynefs of the air, in a manner not eafily reducible to rule. Glafs rods were fubftituted inftead of them, and ultimately adopted. Pyrometrical experiments were inftituted to afcertain the exact law of their variation from heat and cold. The extremities of the bafe were marked by two pipes, and afterwards by cannon. The line joining them was meafured through the air, and not by a fucceffion of level lines of unequal altitudes, as had been ufually practifed in other countries. The inclination of this hypothenufal line to the horizon was meafured by a proper inftrument, and the requifite correction applied.

The firft meafurement of the bafe with the glafs rods gave for its total length 27404.08 feet.

In the year 1791, this bafe was meafured a fecond time, with a fteel chain of exquifite workmanfhip, conftructed by Ramfden, and this meafurement gave 27404.315 feet, differing but $2\frac{3}{4}$ inches from the former. The ftandard meafure ufed on this occafion was taken from a brafs fcale 42 inches in length, in the poffeffion of the royal fociety. A bafe of verification was likewife meafured on Romney-marfh, in the fame manner as had been done on Hounflow-heath, except that the fteel chain was fubftituted for the glafs rods.

The length of this bafe, after all the requifite reduction, was 28,535 feet, 8.128 inches.

The theodolite deftined to meafure the angles furpaffed, as we have before mentioned, in its dimenfions and elaborate workmanfhip, every inftrument of the kind that had been feen in Europe; it meafured angles with fuch precifion, that it became neceffary, in the calculation of the triangles, to take into confideration the excefs of three fpherical angles above two right angles, a quantity that had hitherto been too minute to be afcertained by any inftrument, and was only known by theory to have an exiftence. The amount of the total error in the fum of the three angles never exceeded 3″, fo that the angles generally muft have been meafured to the neareft fecond. A portable obfervatory, and portable fignals, were likewife ufed in this furvey, fo that the centre of the theodolite was conftantly brought into the very point, which was to conftitute the fignal from the next ftation; by which means all the troublefome corrections, which we fhall have occafion to notice in the French furvey, were avoided, and all caufe of error arifing from them entirely removed.

As the fituation of Paris, with refpect to Dunkirk, had been fettled by former operations, the only part of this procefs that required the co-operation of French aftronomers, was to continue the triangles from Dover to Dunkirk. This was undertaken by Caffini, Mechain, and Le Gendre, men of deferved celebrity, and members of the academy of fciences. It was by them that the firft trial was made with the repeating circle. The one they ufed on this occafion was only twelve inches diameter, and the firft that had been conftructed; yet it is beyond a doubt, but that the angles taken with it differed but little in exactnefs from thofe obferved with the theodolite. The latter was certainly the fuperior inftrument, but it was large and of difficult tranfport; whereas the French inftrument went into a fmall box, which the aftronomers carried with them in their voiture.

The inftrument was fucceffively carried to twenty-three different ftations, which were diftinguifhed into two fets; the firft were permanently marked by pipes funk in the earth, the others were thofe where the inftrument was elevated to the top of fome tower, fteeple, or other building.

The ftations of the firft fet marked with pipes are fourteen in number, *viz.*

Hampton poor-houfe, } the extremities of Hounflow-
King's-Arbour, } heath bafe.
St. Ann's-hill, about the middle of the eaft edge.
Hundred-acres, near the weft end of the garden.
Norwood, towards the Croydon end of the heights.
Botley-hill, in a field belonging to Simpsfield-Lodge farm.
Wrotham-hill, in a field belonging to Mr. Johnfton.
Hollingborn-hill, in a field belonging to Mr. Duppa.
Fairlight-down, 347 feet fouthward from the windmill, which makes with Fairlight church an angle of 105° 53′ 20″.
Ruckinge, } the extremities of the bafe of verification.
High-Nook, }
Allington-knell, an artificial mount belonging to fir John Honeywood.
Paddlefworth, eaftward from the church in the broomfield belonging to Mr. Brockman.
Folkftone turnpike, weftward from the public houfe.

The ftations of the fecond fet, where the inftrument was elevated on buildings, are nine in number.

Hanger-hill-tower.
Tranfit room of Greenwich royal obfervatory.
North-weft turret of Sevendroog caftle, on Shooter's-hill.
Swingfield church fteeple.
North turret of the fteep of Dover caftle.
Lydd fteeple.
Tenterden fteeple.
Goodhurft fteeple.
Frant fteeple.

The ftations on the French fide were,

Montlambert.
Calais.
Blancnez.
Fiennes.
Watten.
Mount Caffel.
Dunkirk.

The direction of the fides of the triangles was determined by placing the theodolite over the tranfit inftrument at Greenwich, and obferving the angle which the meridian mark made with the next ftation.

When thefe were corrected, they found 37 triangles, as reprefented in *Plate* VIII., the fides and angles of which were obferved and calculated as follows:

Bafe at Hounflow-heath meafured with glafs rods - - -	27404.01 feet.
By meafurement with a fteel chain in 1791 - - -	27404.32
Mean length - -	27404.2

No of Triangles.	Names of the Stations.	Obferved Angles.	Spherical Excefs.	Diff. or Error.	Angles corrected for Calculation.	Diftances.
		° ′ ″	″	″	° ′ ″	Feet.
I.	Hanger-hill tower - -	42 2 32			42 2 34	
	Hampton Poor-houfe	67 55 39			67 55 39	
	King's Arbour - -	70 1 48			70 1 47	
		179 59 59	0.29	— 1.29		
	The Bafe between Hampton Poor-houfe and King's Arbour -				— — —	27404.2
	Hanger-hill tower from { Hampton Poor-houfe -				— — —	38460 4
	{ King's Arbour - -				— — —	37921.9
II.	St. Ann's-hill - -	44 18 51.5			44 18 51.5	
	Hampton Poor-houfe - -	61 26 33.1			61 26 33.5	
	King's Arbour - -	74 14 35			74 14 35	
		179 59 59.6	0.21	— 0.61		
	St. Ann's-hill from { Hampton Poor-houfe -				— — —	37753.6
	{ King's Arbour- - -				— — —	34455.2
III.	Wardrobe tower of Windfor caftle - - -	— — —			58 9 58.5	
	King's Arbour - -	62 40 27.5			62 40 27.5	
	St. Ann's-hill - - -	59 9 14			59 9 14	
			0.25			
	Windfor caftle from { King's Arbour - -				— — —	34819
	{ St. Ann's-hill - -				— — —	36032
IV.	Hundred Acres - -	53 58 35.75			53 58 36.5	
	Hanger-hill tower - -	68 24 44			68 24 44	
	St. Ann's-hill - -	57 36 39.5			57 36 39.5	
		179 59 59.25	1.08	— 1.83		
	Hundred Acres from { Hanger-hill tower - -				— — —	71932.8
	{ St. Ann's-hill - -				— — —	79209.7
V.	Severndroog caitle, Shooter's-hill	53 31 10			53 31 9.75	
	Hanger-hill tower - -	55 53 44.3			55 53 44	
	Hundred Acres - -	70 35 6.75			70 35 6.25	
		180 0 1.05	1.18	— 0.13		
	Sevendroog caftle from { Hanger-hill tower -				— — —	84375
	{ Hundred Acres - -				— — —	74076.2
VI.	Norwood - - -	107 53 37			107 53 35.75	
	Hanger-hill tower - -	26 12 22.5			26 12 23	
	Severndroog caftle - -	45 54 1.5			45 54 1.25	
		180 0 1	0.44	+ 0.56		
	Norwood from { Hanger-hill tower - -				— — —	36721
	{ Severndroog caftle - -				— — —	39154.4

No. of Triangles.	Names of the Stations.	Observed Angles.	Spherical Excess.	Diff. or Error.	Angles corrected for Calculation.	Distances.
		° ′ ″	″	″	° ′ ″	Feet.
VII.	Norwood - - - - -	88 5 58			88 5 58 07	
	Hanger-hill tower - -	29 41 20.75			29 41 21	
	Hundred-acres - -	— — —			62 12 40.93	
			0.53			
	Norwood from Hundred-acres - -				— — —	35647.5
VIII.	Transit room, Greenwich Observatory - - -	111 56 50			111 56 50	
	Severndroog-castle - -	47 48 14			47 48 13	
	Norwood - - -	20 14 58			20 14 57	
		180 0 2	0.1	+1.9		
	Greenwich Observatory from { Severndroog-castle - -				— — —	14610.3
	{ Norwood - - -				— — —	31273.9
IX.	Botley-hill - - -	74 37 17.5			74 37 18	
	Hundred-acres - - -	66 0 56.2			66 0 56	
	Severndroog castle - -	39 21 46.25			39 21 46	
		179 59 59.95	0.78	−0.83		
	Botley-hill from { Hundred-acres - -				— — —	48725.8
	{ Severndroog-castle - -				— — —	70193 4
X.	Wrotham-hill - - -	54 25 1			54 25 1.25	
	Botley-hill - - -	67 53 11			67 53 10.25	
	Severndroog-castle - -	57 41 49			57 41 48. 5	
		180 0 1	1.12	−01.2		
	Wrotham-hill from { Botley-hill - - -				— — —	72951.7
	{ Severndroog-castle - -				— — —	79960.6
XI.	Frant - - - -	50 19 19			50 19 18	
	Botley-hill - - -	57 15 11.25			57 15 11	
	Wrotham-hill - -	72 25 31.2			72 25 31	
		180 0 1 45	1.3	+0.15		
	Frant from { Botley hill - - -				— — —	90362.4
	{ Wrotham-hill - -				— — —	79722
XII.	Hollingborn-hill - -	— — —			47 18 59	
	Wrotham-hill - -	84 12 24.5			84 12 24.5	
	Frant - - -	48 28 37.5			48 28 37 5	
			1.52			
	Hollingborn-hill from { Wrotham-hill - - -				— — —	81195
	{ Frant - - - -				— — —	107895.7
XIII.	Fairlight-down - -	48 25 53.5			48 25 55	
	Frant - - - - -	79 23 3			70 23 2	
	Hollingborn-hill - -	— — —			52 11 3	
			2.85			
	Fairlight-down from { Frant - - - - -				— — —	113926
	{ Hollingborn-hill - -				— — —	141744.4

Triangles.	Names of the Stations.	Obſerved Angles.	Spherical Exceſs.	Diff. or Error.	Angles corrected for Calculation.	Diſtances.
		° ′ ″	″	″	° ′ ″	Feet.
XIV.	Goudhurſt - - -	35 26 32.5			35 26 34.5	
	Botley-hill - - -	40 4 42			40 4 42	
	Wrotham-hill - - -	104 28 44			104 28 43.5	
		179 59 58.5	1.35	−2.85		
	Goudhurſt from { Botley-hill - - -				— — —	121813.5
	Goudhurſt from { Wrotham-hill - - -				— — —	81000.2
XV.	Goudhurſt - - -	72 23 32.5			72 23 33.87	
	Frant - - - -	75 33 16			75 33 13.63	
	Wrotham-hill - -	32 3 12.8			32 3 12.5	
		180 0 1.3	0.81	+0.49		
	Goudhurſt from Frant - - - -				— — —	44591.2
XVI.	Hollingborn-hill - -	63 46 44			63 46 47	
	Wrotham-hill - - -	52 9 11.5			52 9 11	
	Goudhurſt - - -	64 4 3.5			64 4 2	
		179 59 59	1.22	−2.22		
	Hollingborn-hill from Goudhurſt - - -				— — —	71298.5
XVII.	Tenterden - - -	67 7 55			67 7 56.46	
	Goudhurſt - - -	68 13 21			68 13 19.5	
	Hollingborn-hill - -	— — —			44 38 44.04	
			0.85			
	Tenterden from { Goudhurſt - -				— — —	54376.5
	Tenterden from { Hollingborn-hill - -				— — —	71887.5
XVIII.	Fairlight-down - -	— — —			35 20 58.42	
	Goudhurſt - - -	49 39 34			49 39 35.77	
	Tenterden - - -	94 59 26			94 59 25.81	
			0.91			
	Fairlight-down from { Goudhurſt - -				— — —	93629.2
	Fairlight-down from { Tenterden - -				— — —	71637.2
XIX.	Allington-knoll - -	48 24 38			48 24 39	
	Hollingborn-hill - -	— — —			40 0 58.96	
	Tenterden - - -	91 34 23			91 34 22.04	
			10.5			
	Allington-knoll from { Hollingborn-hill - -				— — —	96039.8
	Allington-knoll from { Tenterden - - -				— — —	61777.5
XX.	Lydd - - - -	— — —			63 14 9.82	
	Allington-knoll - -	73 0 27.5			73 0 27	
	Tenterden - - -	43 45 22			43 45 23.18	
			0.67			
	Lydd from { Allington-knoll - -				— — —	47850.9
	Lydd from { Tenterden - -				— — —	66169.2

No. of Triangles.	Names of the Stations.	Obferved Angles.	Spherical Excefs.	Diff. or Error.	Angles corrected for Calculation.	Diftances.
		° ′ ″	″	″	° ′ ″	Feet.
XXI.	Fairlight-down	54 59 18.5			54 59 17.31	
	Lydd	— — —			62 27 50.18	
	Tenterden	62 32 53			62 32 52.51	
			0.99			
	Fairlight-down from Lydd				— — —	71692.2
XXII.	Allington-knoll	32 59 22.5			32 59 23	
	Lydd	125 42 0.25			125 42 0	
	Fairlight-down	— — —			21 18 37	
			0.33			
	Allington-knoll from Fairlight-down				— — —	106926.2
XXIII.	Lydd	43 20 48.25			43 20 48.5	
	Ruckinge	48 58 49.75			48 58 49.5	
	High-nook near Dym-church	87 40 21.75			87 40 22	
		179 59 59.75	0.21	− 0.26		
	Lydd from Ruckinge				— — —	41535.3
	Lydd from High-nook				— — —	31363.7
XXIV.	Allington-knoll	91 27 20			91 27 19.5	
	Ruckinge	54 19 17			54 19 18.5	
	High-nook	34 13 21			34 13 22	
		179 59 58	0.09	− 2.09		
	Allington-knoll from High-nook				— — —	23185.7
	Allington-knoll from Ruckinge				— — —	16053
XXV.	Folkftone-turnpike	24 17 6.25			24 17 6.25	
	Allington-knoll	76 1 54			76 1 53.25	
	High-nook	79 41 0.75			79 41 0.5	
		180 0 1	0.29	+ 0.71		
	Folkftone-turnpike from Allington-knoll				— — —	55463.6
	Folkftone-turnpike from High-nook				— — —	54708
XXVI.	Folkftone-turnpike	— — —			32 6 56.89	
	Allington-knoll	109 50 40			109 50 39.35	
	Lydd	38 2 24			38 2 23.76	
			0.59			
	Folkftone-turnpike from Lydd				— — —	84662.8
XXVII.	Padlefworth	108 9 34.5			108 9 34.5	
	High-nook	— — —			14 48 25.5	
	Folkftone-turnpike	57 2 0			57 2 0	
			0.16			
	Padlefworth from High-nook				— — —	48305.2
	Padlefworth from Folkftone-turnpike				— — —	14714.3

No of Triangles	Names of the Stations.	Obſerved Angles.	Spherical Exceſs.	Diff. or Error.	Angles corrected for Calculation.	Diſtances.
		° ′ ″	″	″	° ′ ″	Feet.
XXVIII	Padleſworth - - -	105 29 40.5			105 29 40	
	Lydd - - - -	9 38 29			9 38 29.36	
	Folkſtone-turnpike - -	— — —			64 51 50.64	
			0.27			
	Padleſworth from Lydd - - - -				— — —	79536.1
	Padleſworth from Folkſtone-turnpike - -				— — —	14714.3
XXIX.	Padleſworth - - - -	12 16 3			12 16 2.65	
	Lydd - - - -	154 5 54.75			154 5 54.4	
	Fairlight-down - - -	— — —			13 38 2.95	
			0.59			
	Padleſworth from Fairlight-down - - -				— — —	147392
XXX.	Swingfield - - -	48 38 15			48 38 15	
	Padleſworth - - -	70 54 5.5			70 54 5.5	
	Folkſtone-turnpike - -	60 27 39.5			60 27 39.5	
		180 0 0	0.06	—0.06		
	Swingfield from Padleſworth - - -				— — —	17056.6
	Swingfield from Folkſtone-turnpike - -				— — —	18525.8
XXXI.	Dover-caſtle, north turret -	34 39 26.5			34 39 26.5	
	Swingfield - - -	75 36 40			75 36 40	
	Folkſtone - - -	69 43 53.5			69 43 53.5	
		180 0 0	0.13	—0.13		
	Dover-caſtle from Swingfield - - -				— — —	30560.4
	Dover-caſtle from Folkſtone-turnpike - -				— — —	31555.7
XXXII.	Dover-caſtle - - -	— — —			21 37 55.42	
	Padleſworth - - -	152 15 25.5			152 15 25.15	
	Fairlight-down - - -	— — —			6 6 39.43	
			0.69			
	Dover-caſtle from Fairlight-down - - -				— — —	186119
XXXIII	Dover-caſtle - - -	— — —			37 30 29.58	
	Fairlight-down - - -	— — —			43 19 58.52	
	Montlambert - - -	— — —			49 9 31.9	
			7.4			
	Montlambert from Dover-caſtle - - -				— — —	168827
	Montlambert from Fairlight-down - - -				— — —	245786
XXXIV	Fairlight-down - - -	— — —			25 33 55.02	
	Dover-caſtle - - -	— — —			110 55 29.83	
	Blancnez - - - -	— — —			43 30 35.15	
			4.78			
	Blancnez from Fairlight-down - - -				— — —	252505.6
	Blancnez from Dover-caſtle - - -				— — —	116660

No. of Triangles.	Names of the Stations.	Obſerved Angles.	Spherical Exceſs.	Diff or Error.	Angles corrected for Calculation.	Diſtances.
		° ′ ″	″	″	° ′ ″	Feet.
XXXV.	Dover-caſtle - - -	23 25 0.25			23 25 0 25	
	Montlambert - - -	— — —			36 53 18.11	
	Blancnez - - - -	— — —			119 41 41.64	
			1.84			
	Blancnez from Montlambert -				— — —	77237.7
XXXVI.	Dover-caſtle - - -	12 46 33½	—	—	12 46 42	
	N. D Calais - - -	— — —	—	—	47 27 6	
	Blancnez ſig. - - -	— — —	—	—	119 46 12	
	Nötre-Dame at Calais from Dover -				— — —	137455
XXXVII.	Calais from Dunkirk 123,727 feet.					
	N. D. Calais - - - - - - - - - -				139 17 30	
	Dover-caſtle, Dunkirk - - - - - - computed				19 14 12	
					21 28 18	
	Dover-caſtle from the tower of Dunkirk - - -				— — —	244916

Table, containing the Bearings of the Stations from the Parallels to the Meridian of Greenwich: alſo their Diſtances from the Meridian and its Perpendicular.

Stations.	Bearings.	Diſtances from Meridian.	Diſtances from Perpend.	Stations.	Bearings.	Diſtances from Meridian.	Diſtances from Perpend.
	° ′ ″	Feet.	Feet.		° ′ ″	Feet.	Feet.
At Greenwich.				Fairlight-down -	23 15 17 SE	143312	218618
Severndroog-caſtle obſerved	73 49 34 SE	14032	4070	*At Tenterden.*			
Norwood obſerved	38 7 16 SW	19306	24603	Lydd . - - -	50 27 12 SE	209345	190701
At Norwood.				Allington-knoll -	85 47 25 NE	219933	144036
Hundred-acres -	42 22 39 SW	43333	50937	*At Allington-knoll.*			
Hanger-hill - -	49 31 23 NW	67739	16729	Ruckinge - -	70 25 32 SW	204807	149414
At Hanger-hill.				High-nook - -	21 1 48 SE	228253	165678
Hampton Poor-houſe -	23 30 53 SW	83085	18537	Folkſtone-turnpike -	82 56 19 NE	274976	137216
St. Ann's-hill - -	48 34 42 SW	119402	2885	*At Folkſtone-turnpike.*			
King's-arbour - -	65 33 27 SW	102263	1038	Padleſworth - -	64 18 47 NW	261715	130839
At Severndroog-caſtle.				Swingfield - -	3 51 8 NE	273730	118734
Botley-hill - - -	11 23 18 SW	172	72881	Dover-caſtle -	65 52 46 NE	303775	124322
Wrotham-hill - -	46 18 30 SE	71849	59305	*At Dover-caſtle.*			
At Wrotham-hill.				Montlambert -	27 56 55 SE	382910	273458
Frant - - -	6 50 58 SW	62341	138458	Blancnez Signal -	51 21 55 SE	394904	197159
Goudhurſt - - -	25 12 15 SE	106345	132596	Calais Spire - -	64 8 37 SE	427470	184268
Hollingborn-hill -	77 21 26 SE	151082	77079	Tower of Dunkirk -	83 22 49 SE	547058	152556
At Goudhurſt.							
Tenterden - - -	72 54 53 SE	158321	148571				

Table, containing the Bearings and direct Diſtances of the Stations from Greenwich Obſervatory.

Stations.	Bearings.	Diſtances.	Stations.	Bearings.	Diſtances.
	South-weſtward. ° ′ ″	Feet.		South-eaſtward. ° ′ ″	Feet.
Norwood - - - -	38 7 16	31274	Goudhurſt ſteeple - -	38 43 49	169974
Hundred-acres - - -	40 23 18	66876	Hollingborn hill - - -	62 58 13	169608
Hanger-hill tower - -	76 7 39	69771	Tenterden-ſteeple - -	46 49 11	217115
Hampton Poor-houſe - -	77 25 22	85128	Fairlight-down - - -	33 14 47	261404
St. Ann's hill - - -	76 24 56	122836	Lydd-ſteeple - - -	47 40 6	285182
King's-arbour - - -	89 25 6	102268	Allington-knoll - - -	56 46 44	262901
	South-eaſtward.		Ruckinge - - - -	53 53 16	253517
			High nook - - -	54 1 33	282044
Severndroog-caſtle - -	73 49 34	14610	Folkſtone turnpike - -	63 28 49	307311
Botley-hill - - -	0 8 7	72881	Padleſworth - - -	63 26 17	292598
Wrotham-hill - - -	50 27 48	93163	Swingfield-ſteeple - -	66 33 2	298372
Frant-ſteeple - - -	24 14 23	151846	Dover-caſtle - - -	67 44 34	328231

TABLE, containing the Latitudes of the Stations; and their Longitudes from Greenwich.

	Lat.	Long.	In Time.
	° ′ ″	Weſt. ° ′ ″	m s
Greenwich ob. -	51 28 40		
Norwood - -	51 24 37½	0 5 3	0 20.2
Hundred-acres -	51 20 17½	0 11 20	0 45.3
Hanger-hill tower	51 31 23½	0 17 48	1 11.2
Hampton Poor-houſe	51 25 35½	0 21 47	1 27.1
King's-arbour -	51 28 47½	0 26 50	1 47 3
St. Ann's-hill -	51 23 51½	0 31 17	2 5.1
		Eaſt.	
Botley-hill -	51 16 41½	0 0 3	0 0.2
Severndroog-caſtle on Shooter's-hill -	51 28 0	0 3 41	0 14.7
Frant-ſteeple -	51 5 54	0 16 13	1 4.9
Wrotham-hill	51 18 54	0 18 47	1 15.1
Goudhurſt-ſteeple	51 6 49½	0 27 40	1 50.7
Fairlight-down	51 52 39	0 37 7	2 28.5
Hollingborn-hill	51 15 53½	0 39 28	2 37.9
Tenterden-ſteeple	51 4 8	0 41 11	2 44.8
Ruckinge -	51 3 55	0 53 16	2 33.1
Lydd-ſteeple -	50 57 7½	0 54 19	3 37.9
Allington-knoll -	51 4 46	0 57 13	3 48.9
High-nook, near Dym. church -	51 1 11½	0 59 18	3 57.2
Padleſworth -	51 6 50½	1 8 8	4 32.5
Swingfield-ſteeple	51 8 48	1 11 18	4 45.2
Folkſtone-turnpike	51 5 45½	1 11 33	4 46.2
Dover-caſtle, N. turret of the Keep -	51 7 47½	1 19 7	5 16.5
On the Coaſt of France.			
Montlambert near Boulogne -	50 43 2	1 38 51	6 35.2
Blanenez -	50 55 31½	1 42 24	6 49.6
N. D at Calais -	50 57 30½	1 50 56	7 23.7

The reſult, independent of theory, as far as relates to the immediate object of the undertaking, is, that the diſtance between the parallels of latitude of Greenwich and Paris is 160,659 fathoms, or 963.954 feet, which correſponds to an arc of 2° 38′ 26″, which gives the length of a degree of the meridian in the latitude 50° 10′, equal to 60,843 fathoms. The perpendicular diſtance of the tower of Dunkirk being 547,058, and Dunkirk 9080 feet eaſt of the meridian of Paris, the diſtance of the meridians of Greenwich and Paris, reckoned on the parallel (to the perpendicular) paſſing through Dunkirk, is 537,978 feet. With reſpect to the difference of longitude, ſome uncertainty ſtill exiſts, which it is not eaſy to remove. The French aſtronomers, calculating from a general hypotheſis of the figure of the earth, make it 9ᵐ 21″ of time. But colonel Mudge, by aſſuming a partial hypotheſis, adapted to the intermediate country, and ſuch as reſults from actual meaſurement, makes the difference of longitude 9ᵐ 19″.4: the latter determination certainly appears to us to be far the moſt probable; the truth is, perhaps, between both. Dr. Maſkelyne, from aſtronomical obſervation, eſtimates it 9ᵐ 20″, and nearer than this it will probably never be known.

Meaſurement of a Degree perpendicular to the Meridian.

The object of Caſſini's memoir, relative to the junction of Greenwich and Paris, being thus accompliſhed, the further proſecution of the ſurvey was ſuſpended for a long time by the death of general Roy; but the duke of Richmond, then maſter of the ordnance, having, by an accidental circumſtance, obtained from Ramſden a new theodolite of the ſame dimenſions as that above noticed, but with conſiderable improvements, and two new ſteel chains, by the ſame artiſt, his Grace availed himſelf of the influence his ſituation commanded, and procured the king's permiſſion for the recommencement of the ſurvey, which has ſince been extended to the remoteſt parts of the kingdom. On the death of general Roy, the care of conducting this great work was entruſted to colonel Mudge, who had already diſtinguiſhed himſelf by his ſuperior talents, and who has executed the arduous taſk committed to his charge in a manner that ſhews him to have been moſt eminently qualified for the undertaking.

He was for ſome time aſſiſted by Mr. Dalby, a mathematician of conſiderable reputation, who has contributed many valuable theorems relative to the object of their purſuit, but who was obliged by ill health to relinquiſh his employment.

The greater part of theſe operations we conſider as quite foreign to our preſent ſubject; but two objects which immediately relate to it, have been accompliſhed in the courſe of this ſurvey. Theſe are the direct meaſurement of an arc of the meridian, and of a degree of a great circle perpendicular to it.

The latter operation might be made the ſubject of a ſeparate article, but as it occurred firſt in order of time, and as the two meaſurements had the baſe and ſeveral triangles in common, we prefer making it the firſt ſubject of our conſideration.

The operations of 1791 began by a re-meaſurement of the baſe, with the ſteel chains, and, as we have already ſtated, a difference of only 2¾ inches was found between the two meaſures.

New ſtations were choſen to extend the ſurvey weſtward, and to unite Dunnoſe and Beachy-head with the former triangles. Theſe ſtations were choſen to meaſure the perpendicular degree, as they were nearly eaſt and weſt of each other, and were in favourable weather reciprocally viſible, though more than 60 miles diſtant. Some of the ſides of the former ſeries of triangles being common to the new, an opportunity occurred of judging of the accuracy of the two meaſurements; and the ſide of a triangle of near forty miles in length was not found to differ in the new ſurvey but 16 inches from the length computed in the former one.

A baſe of verification was meaſured on Saliſbury-plain, the length of which was reduced to the ſame level as that on Hounſlow-heath = 36,574.4 feet. One branch of this ſeries of triangles towards the weſt was conſtructed almoſt entirely for the purpoſe of connecting this new baſe with the original baſe of departure on Hounſlow-heath, and the length deduced by calculation did not differ an inch from the actual meaſurement.

Three other principal branches of the triangle ſerved to connect Dunnoſe and Beachy-head with the baſes, and with the former triangles of general Roy. So that the diſtance from Dunnoſe to Beachy-head was determined by four different computations, and appeared to be as follows:

$$\left.\begin{array}{l} 339{,}394.6 \\ 339{,}395.0 \\ 339{,}399.2 \\ 339{,}401.5 \end{array}\right\} \begin{array}{l} \text{mean} \\ 339{,}397.6 = \text{diſtance of Dunnoſe and Beachy-head.} \\ = 64.28 \text{ miles.} \end{array}$$

The azimuthal angle at Dunnoſe was found by obſervations of the Pole Star to be - - - 81° 56′ 53″
and at Beachy-head - - - 96 55 58

Let

Let P G M (*Plate* VII. *fig.* 56.) be the meridian of Greenwich; then if M B be the parallel to the perpendicular at G, Greenwich, we have M B = 58,848 feet, and G M = 269,328 feet. Therefore, taking 60,851 fathoms for the length of the degree on the meridian, as derived from the difference of latitude between Greenwich and Paris, applied to the meafured arc (fuppofing the latitude of Paris 48° 50′ 14″), we get G M = 44′ 15″.26, confequently the latitude of the point M (that of Greenwich being 51° 28′ 40″) is 50° 44′ 24″.74, and the co-lat. P M = 39° 15′ 35″.26.

With refpect to the arc M B, for the prefent purpofe it is not of confequence on what hypothefis it be obtained. But if 61,173 fathoms be affumed for the length of a degree of a great circle, perpendicular to the meridian at M, then M B = 9′ 37″.19, and the latitude of B, Beachy-head, will be found 50° 44′ 23″.71.

Again (*fig.* 57.), let W B be the arc of a great circle perpendicular to the meridian of Beachy-head, at B, meeting that of Dunnofe in W, and let D R be another arc of a great circle perpendicular to the meridian of Dunnofe in D, meeting that of Beachy-head in R: then we fhall have two fmall fpheroidical triangles W B D and R B D, having in each two angles given, namely, W D B = 81° 56′ 53″, and W B D = 6° 55′ 58″, in the triangle W B D; and D B R = 83° 4′ 2″ with B D R = 8° 3′ 7″, in the triangle D B R; and thefe reduced to the angles formed by the chords, give the following triangles for computation; namely,

In the triangle W B D	W B D =	6°	55′	57″.2
	W D B =	81	56	52.4
	D W B =	91	7	10.4
In the triangle B D R	B D R =	8°	3′	6
	D B R =	83	4	1
	D R B =	88	52	53

In which it muft be noted, that the reduced angles are given to the neareft $\frac{1}{4}''$

Again, let B I and D E be the parallels of latitude of Beachy-head and Dunnofe, meeting the meridians in L and E: then to find L W and E R, we have two fmall triangles, that may be confidered as plane ones, namely, L B W and E D R, in which the angles at W and R are given nearly.

Now the excefs of the three angles above 180° in the triangle D B W, confidered as a fpherical one, is 3″ nearly. Therefore the angle D W B will be 91° 7′ 12″ nearly. Hence B W L = 88° 52′ 48″, confequently B L W = 90° 33′ 36″, and L B W = 0° 33′ 36″. Therefore with the chord of the arc W B = 336,115.6 feet, we get W L = 3285.2 feet, which added to W D, as found above, gives 44,258.6 feet, for the diftance between the parallels of Beachy-head and Dunnofe. Again, in the triangle D B R, confidered as a fpherical one, the excefs is about $3\frac{1}{2}''$.

Hence, from the two obferved angles at D and B, namely, 8° 3′ 7″, and 83° 4′ 2″, we get the third angle B R D = 88° 52′ 54″.5, and taking the triangle E R D as a plane one, the other angles will be 0° 33′ 32″.75 (E D R), and 90° 33′ 32″75 (D E R); therefore with the chord of the arc D R = 336,980 feet, we get R E = 3288.2 feet, which taken from B R as found above, leaves 44,258 9 feet for the meridional arc or the diftance between the parallels of Beachy-head and Dunnofe, which is nearly the fame as before.

This method of determining the diftance between the parallels is fufficiently correct. But the fame conclufion may be deduced from a different principle, thus:—

Let the difference of longitude, or the angle at P, be found on any hypothefis of the earth's figure, and likewife the latitudes of Beachy-head and Dunnofe; with thefe compute the latitudes of the points R and W: then it will be found that the arc R E is $\frac{5}{100}''$ greater than L W, and $\frac{1}{100}''$ on the meridian is nearly a foot, R E is 5 feet more than L W. Hence $\frac{47547.1 - 5 + 40973.4}{2} = 44257.8$ is the diftance between the parallels, which is very nearly the fame as found by the other method. It feems, therefore, that whatever be the value of the arc between thefe parallels in parts of a degree, the diftance between them is obtained fufficiently near the truth. Therefore, taking 60 851 fathoms for the length of a degree on the meridian, we get the arc fubtended by 44,258.7 feet = 7′ 16″.4, which fubtracted from the latitude of Beachy-head, namely, 50° 44′ 23″.71, leaves 50° 37′ 7″.31 for the latitude of Dunnofe. We have, therefore, for finding the length of the degree of a great circle perpendicular to the meridian at Beachy-head or Dunnofe, the latitudes of the two ftations, and the angles which thefe ftations make with each other and the pole.

Since the fum of the horizontal angles P D B + P B D (*Plate* VII. *fig.* 55.) is nearly the fame as the fum which would be found on a fphere, we fhall find the angles for fpherical computation, as follows:—The co-latitudes of D and B, or the arcs D P and B P, are 39° 22′ 52″.69, and 39° 15′ 36″.29; therefore half their fum is 39° 19′ 14″.49, and half their difference 3′ 38″.2.—Half the fum of the angles P D B and P B D is 89° 26′ 25″.5; therefore as tang. 39° 19′ 14″.49 : tang. 3′ 38″.2 : : tang. 89° 26′ 25″.5 : tang. 7° 31′ 57″.71, or half the difference of the angles. Hence the angles for computation are 81° 54′ 27″.79 and 96° 58′ 23″.21, which with the co-latitudes of D and B give the difference of longitude between Beachy-head and Dunnofe, or the angle D P B = 1° 26′ 47″.93. We have now two right angled triangles (*fig.* 57.), which may be confidered fpherical, namely, P B W and P D R, in which the angle at the pole, P, is given, and likewife the fides P B and P D; therefore ufing thefe data, we find the arc B W = 54′ 56″.21, and the arc D R = 55′ 4″.74. The chords of the two perpendicular arcs are about $3\frac{1}{2}$ feet lefs than the arcs themfelves: therefore B W = 336,119.1 feet, and D R = 336,983.5 feet. And by proportioning thefe arcs to their refpective values in fathoms, we get the length of the degree of the great circle perpendicular to the meridian in the middle point between W and B = 61,182.8 fathoms, and in the middle point between R and D = 61,181.8 fathoms. Therefore 61,182.3 fathoms is the length of a degree of the great circle perpendicular to the meridian, in latitude 50° 41′, which is nearly that of the middle point between Beachy-head and Dunnofe.

Of the Meafurement of an Arc of the Meridian between Dunnofe in the Ifle of Wight, and Clifton in Yorkfhire.

The account of this important part of the Englifh furvey was drawn up by colonel Mudge, and read before the royal fociety in June 1803.

The length of the meafured arc was more than 196 Englifh miles. The triangles extended along a line exactly north and fouth. They were conftructed, and obferved in the fame manner as in the former part of the furvey, and depending on the fame bafes, namely, Hounflow-heath and Salifbury-plain. But, to add greater fecurity to the northern triangles, a bafe was meafured on Mifterton Car, near the northern extremity of the bafe, with the fame chains, and with equal care, as in the former operations. This was the fourth bafe that had been meafured; and though it would not have been prudent to have omitted fo effential a verification, yet, had all the calculations been made

made from one alone, the difference in the results would hardly have been fenfible. The length of the bafe on Mifterton Car was 26.342.7 feet.

Colonel Mudge thus ftates his reafons for felecting this arc in preference to any other.

" In a country, whofe furface throughout its whole extent is equally diverfified with hilly ground, that particular part of it fhould be chofen for carrying on a meridional meafurement which comprehends the moft extenfive arc.

" This arifes from the neceffary confequence which attends an operation in a country fo circumftanced; as poffibly no fpot fixed on for a place could be fuppofed free from the effects of unequal attraction in the adjoining matter.

" In fuch a country, therefore, a meafurement upon the moft extenfive arc muft give the moft accurate conclufion; for the errors arifing from the caufe here mentioned, like thofe of obfervation, leffen in their effects, on their application to arcs of greater magnitude.

" If Great Britain were a country thus diverfified, the moft eligible part would be that where the meridian from Lyme in Dorfetfhire paffes northward into Scotland.

" The difference of latitude between that place and Aberdeen, near to which that line cuts its parallel, is 4° 47′ nearly.

" But, however great the advantages attending fuch a length of arc might be, under the general circumftances of accurate terreftrial meafurement, and accurate obfervations at its extremities, no beneficial confequences could be expected to attend the placing of the fector at intermediate ftations; as the arc would be found running, almoft every where, through a country abounding with hills, confiderable both in magnitude and number.

" Under this confideration, I determined to meafure a portion of the meridian which proceeds from Dunnofe to the mouth of the Tees, becaufe, from inquiry, I had reafon to fuppofe it the longeft meridional arc in Britain, free from any apparent obftruction. And I was led to felect Dunnofe for one of its extremities, as obfervations made there, in conjunction with others at Greenwich, would enable me to make corrections of latitudes of places given in our former papers, if found neceffary. By fixing on Dunnofe, I had alfo the means of afcertaining the diftance of the royal obfervatory from the northern or fouthern end of my line, and, confequently of connecting it with the parallels of Dunkirk and Paris."

For determining the amplitude of the arc, a zenith fector was conftructed by Ramfden. This was the laft work of that great artift, and on which he had exerted all his talents to render it the firft of its kind. The radius of the fector was upwards of eight feet, and the object-glafs of the telefcope four inches in diameter.

The greateft part of the fummer of 1802 was employed by colonel Mudge in making obfervations with this inftrument. It was firft erected at Greenwich, afterwards at Dunnofe, Clifton, and Arbury-hill; and fo many ftars were obferved at each of thefe ftations, that there can hardly remain a doubt of the relative latitudes being determined to the neareft fecond. It is true, we have met with feveral inftances in the courfe of this hiftory, of obfervations made with zenith fectors, which agreed apparently very well with each other; and yet were affected by fome common error of confiderable magnitude, from fome undue pofition of the plane of the inftrument, either with refpect to the vertical or the meridian; but colonel Mudge has fufficiently fhewn how improbable it is that fuch fhould be the cafe here, confidering all the means that were employed, both by the artift and the obferver, to avoid the poffibility of fuch an accident.

The obfervatories of Greenwich and Blenheim were transferred upon the arc by means of triangles, obferved in the former furvey; and thus the latitudes of five different points on it were obtained. The directions of the meridian with the fides of the triangles were obferved both at Clifton and Dunnofe, by obfervations of the pole-ftar, at its greateft elongation, eaft and weft from the meridian. This method, which has uniformly been adopted throughout the Englifh furvey, is the moft accurate that can be devifed. For this kind of obfervation, the repeating circle is much inferior to the theodolite.

The extreme ftations were connected by twenty-two triangles as follows. (Vid. *Plate* VIII. *fig.* 69.)

Butfer-hill from Dunnofe, 140,580.4 feet. Phil. Tranf. for 1795, p. 501.

No. of Triangles.	Names of Stations.	Obferved Angles.	Diff.	Spherical Excefs.	Error.	Angles corrected for Calculation.	Diftances
		° ′ ″	″	″	″	° ′ ″	Feet.
I.	Butfer-hill	76 12 22	−1.99			76 12 21.5	
	Dean-hill	48 4 32.25	−1.54			48 4 31.75	
	Dunnofe	55 43 7	−1.53			55 43 6.75	
		180 0 1.25		5.0	−3.75		
	Dunnofe from Butfer-hill						140580.4
	Dunnofe from Dean-hill						183496.2
II.	Dean-hill	62 22 48.75	−1.37			62 22 47	
	Butfer-hill	48 28 41.5	−1.23			48 28 40	
	Highclere	69 8 35	−1.5			69 8 33	
		180 0 5.25		4.67	+1.18		
	Dean-hill from Butfer-hill						156122.1
	Dean-hill from Highclere						125084.9

No. of Triangles	Names of Stations.	Obferved Angles.	Diff.	Spherical Excefs.	Error.	Angles corrected for Calculation.	Diftances
		° ′ ″	″	″	″	° ′ ″	Feet
III.	Butfer-hill	84 31 45.5	−1 2			84 31 44.5	
	Hind-head	66 15 54.5	−0.83			66 15 54.25	
	Highclere	29 12 22	−0.72			29 12 21.25	
		180 0 2		2.7	−0.7		
		Butfer-hill from Hind-head					78905.7
		Butfer-hill from Highclere					148031 0
IV.	Highclere	34 46 15.75	−0.81			34 46 15	
	Hind-head	83 20 14.25	−1.36			83 20 14	
	Bagfhot-heath	34 46 15.75	−1.88			61 53 31	
		180 0 1.75		3.09	−1.34		
		Highclere from Bagfhot-heath					142952.6
		Highclere from Hind-head					160972.2
V.	Bagfhot-heath	55 32 26	−0.89			55 32 25.25	
	Highclere	46 10 18 25	−0.83			46 10 17.75	
	Nuffield	78 17 18.25	−1.20			78 17 17	
		180 0 2.5		2.94	0.43		
		Nuffield from Bagfhot-heath					105321.2
		Nuffield from Highclere					120374
VI.	White-horfe-hill	63 7 53.25	−0.94			63 7 53.5	
	Highclere	63 18 16.75	−0.94			63 18 17	
	Nuffield	53 33 49.5	−0.86			53 33 49.5	
		179 59 59.5		2.74	−3.24		
		White-horfe-hill from Nuffield					120557.7
		White-horfe-hill from Highclere					108563.1
VII.	White-horfe-hill	38 48 13.25	−0.67			38 48 12.5	
	Nuffield	86 4 16.25	−1.21			86 4 15	
	Brill	55 7 33 5	−0.71			55 7 32.5	
		180 0 3		2.6	+0.4		
		Brill from White-horfe-hill					146603.2
		Brill from Nuffield					92805.5
VIII.	Brill	50 14 44.5	−1.18			50 14 45	
	White-horfe-hill	64 45 43.75	−1.34			64 45 42.5	
	Stow on the Wold	64 59 32	−1.35			64 59 32.5	
		180 0 0.25		3.88	−3.63		
		Stow from White-horfe-hill					124365.6
		Stow from Brill					146326.3
IX.	Brill	32 34 43	−0.61			32 34 42.25	
	Stow on the Wold	60 56 6.25	−0.64			60 56 5.5	
	Epwell	86 29 13.25	−0.11			86 29 12.25	
		180 0 2.75		2.37	+0.38		
		Epwell from Stow					78938.2
		Epwell from Brill					128140
X.	Brill	34 23 58.5	−0.65			34 23 57.5	
	Epwell	85 0 18.5	−1·10			85 0 17.5	
	Arbury-hill	60 35 45.5	−0.70			60 35 45	
		180 0 22.5		2.46	+0.84		
		Arbury-hill from Epwell					83098.4
		Arbury-hill from Brill					146530

No. of Triangles.	Names of Stations.	Obferved Angles.	Diff.	Spherical Excefs.	Error.	Angles corrected for Calculation.	Diftances.
		° ′ ″	″	″	″	° ′ ″	Feet.
XI.	Arbury-hill - -	89 57 4.5	−1.14			89 57 5.5	
	Epwell - - -	54 45 18.75	−0.57			54 45 18.25	
	Corley - - -	35 17 36.75	−0.57			35 17 36.25	
		180 0 0		2.29	−2.29		
	Corley from { Arbury-hill - -						117463
	{ Epwell - - -						143827.8

Length of the Bafe on Mifterton Carr, 26342.7 feet.

No. of Triangles	Names of Stations.	Obferved Angles.	Diff.	Spherical Excefs.	Error.	Angles corrected for Calculation.	Diftances.
		° ′ ″	″	″	″	° ′ ″	Feet.
XII.	Beacon-hill - -	20 47 19.75				20 47 20	
	North end of Bafe -	60 17 16.5				60 17 13	
	South end of Bafe - -	98 55 27.5				98 55 27	
		180 0 3.75					
	Beacon-hill from { North end of Bafe -						64461.7
	{ South end of Bafe - -						73321.9
XIII.	Beacon-hill - -	34 44 42.25				34 44 42	
	North end of Bafe - -	74 46 56.5				74 46 56	
	Gringley on the hill -	70 28 22.25				70 28 22	
		180 0 1					
	Gringley from { North end of Bafe -						44338.2
	{ Beacon-hill - -						75068.0
XIV.	Beacon-hill -	13 57 24				13 57 23	
	Gringley - -	51 11 6.5				51 11 5	
	South end of Bafe -	114 51 32.5				114 51 32	
		180 0 3					
	Gringley from Beacon-hill - -						75068.2
	Wherefore the mean diftance from Gringley to Beacon-hill is 75068.1 feet.						
XV.	Heatherfedge -	18 40 38.5	+0.29			18 40 38	
	Beacon-hill - -	138 9 16	−2.02			138 9 16	
	Gringley -	23 10 6	+0.65			23 10 6	
		180 0 0.5		1.08	−0.58		
	Heatherfedge from { Beacon hill -						92227.2
	{ Gringley - -						156384.8
XVI.	Sutton-Afhfield -	78 47 2	−1.01			78 47 1	
	Heatherfedge - -	54 52 37.5	−0.24			54 52 35	
	Gringley - -	46 20 24	−0.22			46 20 24	
		180 0 3.5		2.45	+1.10		
	Sutton-Afhfield from { Gringley - -						130399.7
	{ Heatherfedge -						115339.9
XVII.	Orpit - -	80 28 57.25	−0.85			80 28 57	
	Heatherfedge -	39 8 38.5	−0.12			39 8 38	
	Sutton-Afhfield -	60 22 25.5	−1.00			60 22 25	
		180 0 1		2.03	−1.03		
	Orpit from { Heatherfedge -						101660.3
	{ Sutton Afhfield -						73826.6

No. of Triangles.	Names of Stations.	Obſerved Angles.	Diff.	Spherical Exceſs.	Error.	Angles corrected for Calculation.	Diſtances.
		° ′ ″	″	″	″	° ′ ″	Feet.
XVIII.	Hollan-hill - -	44 43 32	−0.12			44 43 31	
	Sutton-Aſhfield -	113 49 9	−0.53			113 49 7	
	Orpit - -	21 27 20.5	−0.18			21 27 22	
–		180 0 1.5		0.73	+0.77		
	Hollan-hill from { Sutton-Aſhfield - -						38375.2
	{ Orpit - - -						95975.3
XIX.	Bardon-hill - -	42 58 59.5	−0.69			42 58 59	
	Hollan-hill - -	74 52 38	−1.03			74 52 37	
	Orpit - -	62 8 25	−1.01			62 8 24	
		180 0 2.5		2.75	−0.20		
	Bardon-hill from { Hollan-hill - -						124454.7
	{ Orpit - - -						135895.3
XX.	Caſtle-ring - -	55 32 44	−0.94			55 32 43	
	Bardon-hill - -	68 24 4.75	−1.02			68 24 3	
	Orpit - -	56 3 14.75	−0.90			56 3 14	
		180 0 3.5		2.85	+0.65		
	Caſtle-ring from { Orpit - - -						153235.2
	{ Bardon-hill - -						136717.8
XXI.	Corley - -	72 32 46.5	−1.19			72 32 46	
	Caſtle-ring - -	47 54 42.25	−0.86			47 54 42	
	Bardon-hill - -	59 32 32.25	−0.94			59 32 32	
		180 0 1		2.93	−1.93		
	Corley from { Bardon-hill -						106357.3
	{ Caſtle-ring - -						123539.7
XXII.	Arbury-hill - -	34 14 33.5	−0.98			34 14 33	
	Corley - -	107 20 14.25	−1.99			107 20 14	
	Bardon-hill -	38 25 13.25	−0.80			38 25 13	
		180 0 1		3.37	−2.37		
	Arbury-hill from { Bardon-hill -						180426.0
	{ Corley - -						117457.1

Calculation of the Meridional Diſtance between Dunnoſe and Clifton.

The bearings of certain ſides from the parallels to the meridian of Dunnoſe, by obſervations of the pole-ſtar at Dunnoſe.

	° ′ ″	
Dunnoſe and Butſer-hill -	20 58 39	N.E.
Butſer-hill and Highclere -	34 20 17	N.E.
Highclere and Nuffield -	35 30 40	N.E.
Nuffield and Brill - -	4 51 15	N.W.
Brill and Arbury-hill -	12 30 17	N.W.
Arbury-hill and Bardon-hill	7 42 57	N.W.
Bardon-hill and Orpit -	21 21 9	N.W.
Orpit and Heatherſedge -	5 25 52	N.W.
Heatherſedge and Beacon-hill	61 52 17	N.E.

Theſe bearings, and their reſpective ſides, give the following diſtances on the meridian of Dunnoſe.

	Feet		Miles.
Dunnoſe and Butſer-hill	131,263.0	=	24.86
Butſer-hill and Highclere	122,232.7	=	23.15
Highclere and Nuffield	97,984.7	=	18.56
Nuffield and Brill -	91,755.3	=	17.38
Brill and Arbury-hill -	143,054.1	=	27.09
Arbury-hill and Bardon-hill	178,792.4	=	33.86
Bardon-hill and Orpit -	126,567.8	=	23.29
Orpit and Heatherſedge	101,203.7	=	19.17
Heatherſedge and Beacon-hill	43,480.7	=	8.23

1,036,334 = 196.27, the diſtance between Clifton and the perpendicular to the meridian of Dunnoſe, which may be taken for the true length of the arc itſelf, as the diſtance of the former ſtation from the meridian of the latter is only 4770 feet.

Bearings of the same Sides, deduced from the Observations made at Clifton.

	°	′	″	
Beacon-hill and Heatherfedge	61	51	50	S.W.
Heatherfedge and Orpit -	5	26	19	S.E.
Orpit and Bardon-hill -	21	21	36	S.E.
Bardon-hill and Arbury-hill	7	43	26	S.E.
Arbury-hill and Brill -	12	31	0	S.E.
Brill and White-horfe-hill -	50	15	48	S.W.
White-horfe-hill and Highclere	27	48	6	S.E.
Highclere and Butfer-hill -	34	20	49	S.E.
Butfer-hill and Dunnofe -	20	58	9	S.W.

Thefe bearings and fides give the following parallels to the meridian of Clifton:

Beacon hill and Heatherfedge -	43,490.4
Heatherfedge and Orpit - -	101,202.6
Orpit and Bardon - - -	126,561.3
Bardon-hill and Arbury-hill - -	178,793.2
Arbury-hill and Brill - - -	143,047.4
Brill and White-horfe-hill - -	93,717.6
White horfe-hill and Highclere -	96,031.4
Highclere and Butfer-hill - -	122,219.8
Butfer hill and Dunnofe - -	131,270.2

The fum 1,036,33.39 feet, is the diftance between Dunnofe and the perpendicular to the meridian of Clifton; or the length of the arc itfelf. There is therefore a difference of only half a foot between the two refults. We may confequently take 1,036,334 for the diftance required.

The fubtenfes in the heavens of the different parts of the terreftrial arc are as follows:

	°	′	″
1. Dunnofe and Clifton - -	2	50	23.38
2. Dunnofe and Arbury-hill -	1	36	19.98
3. Arbury-hill and Clifton -	1	14	3.40
4. Dunnofe and Greenwich -	0	51	31.39
5. Greenwich and Clifton -	1	58	51.59
6. Arbury-hill and Greenwich	0	44	48.19
7. Dunnofe and Blenheim -	1	13	19.69
8. Blenheim and Clifton - -	1	37	3.69

The following terreftrial arcs are thofe ufed in conjunction with the preceding ones for computing the length of a degree:

Arcs	Feet.
1. Dunnofe and Clifton - -	1,036,337
2. Dunnofe and Arbury-hill -	586,320
3. Arbury-hill and Clifton - -	450,017
4. Dunnofe and Greenwich -	313,696
5. Greenwich and Clifton - -	722,641
6. Arbury-hill and Greenwich -	272,624
7. Dunnofe and Blenheim -	446,498
8. Blenheim and Clifton - -	589,839

And by fimply dividing the terreftrial arcs by their correfponding celeftial ones, and afterwards multiplying the feveral quotients by 3600″, we fhall get the length of the degrees as follows:

		Fathoms.
Middle point between	Dunnofe and Clifton	60,820
	Dunnofe and Arbury-hill	60,864
	Arbury-hill and Clifton	60,766
	Dunnofe and Greenwich	60,884
	Greenwich and Clifton	60,794
	Arbury-hill and Greenwich	60,849
Middle point between	Blenheim and Clifton	60,769
	Blenheim and Dunnofe	60,890

5

Taking the latitude of Greenwich at 51° 28′ 40″ from the feveral arcs now given, the latitudes of their middle points are eafily found, and, with the lengths of the degrees, when properly arranged, will ftand as follows:

	Lat. of middle Point. ° ′ ″	Fath.
Arbury-hill and Clifton -	52 50 29.8	60,766
Blenheim and Clifton - -	52 38 56.1	60,769
Greenwich and Clifton -	52 28 5.7	60,794
Dunnofe and Clifton - -	52 2 19.8	60,820
Arbury-hill and Greenwich -	51 51 4.1	60,849
Dunnofe and Arbury-hill -	51 35 18.2	60,864
Blenheim and Dunnofe -	51 13 18.2	60,890
Dunnofe and Greenwich -	51 2 54.2	60,884

Colonel Mudge thus concludes his account of this operation:

"From this meafurement it appears, that the length of a degree on the meridian, in latitude 52° 2′ 20″, is 60,820 fathoms. This conclufion is deduced from the fuppofition of the whole arc fubtending an angle of 2° 50′ 23″.38 in the heavens, and a diftance of 1,036,337 feet on the furface of the earth.

"The length of the degree at the middle point (51° 35′ 18″) between the fouthern extremity of the arc and Arbury-hill, is 60,864 fathoms; which is greater than the above, and exceeds it by 44 fathoms. But this degree, admitting the earth to be an ellipfoid, with the ratio of its axes as 229 to 230, fhould be about 10 fathoms lefs. If the meafurement of the terreftrial arc be fufficiently correct, and the earth of an elliptical form in thefe latitudes, either the arcs affording the deductions are incorrect, or fome material deflection of the plumb-line has taken place, at one or two ftations, from the effect of attraction.

"Without arrogating to myfelf any merit from the pains taken in the performance of this undertaking, I may fay, I am fo perfectly convinced of the general accuracy of the whole, that I cannot for a moment doubt the collective evidence of its fufficiency. From an examination of my field books, and from the remeafurement of the chains ufed in our bafe-line on Mifterton Carr, I think it is probable that an error in the whole diftance, of 197 miles nearly, does not fubfift to an amount of more than 100 feet, correfponding to 1″ in the amplitude of the whole arc, and I alfo think it probable it cannot amount to half that quantity. The fuppofition of the zenith diftances of the ftars being generally erroneous, at any one ftation, cannot be admitted, unlefs it fhould be imagined, that the plane of the fector's limb was not got into that of the meridian. Such an idea, however, can fcarcely be entertained, after a careful examination of the feveral obfervations, and a due attention to the means by which the inftrument was made to affume its right pofition. Perhaps, alfo, I fhould not fail to obferve, in this place, that although the inftrument was always brought into the plane of each meridian by means of the telefcope attached to the fide of the great tube, and the azimuth circle, yet, having two good chronometers in my poffeffion, I repeatedly verified the truth of the fector's pofition, by obferving the tranfits of two ftars, north and fouth of the zenith, at the greateft diftances my arc would admit of. But, to return, if there be an error in the amplitude of the total arc, from a deflection of the plumb-line at either of the ftations,

tions, it is not probable that any such deflection existed at Dunnose; as the deviation of it towards the north, from a deficiency of matter towards the channel, would tend to diminish the inequality between the lengths of the two degrees. This will be evident, on consideration. I am therefore disposed to believe that the plumb-line was drawn towards the south, from the action of matter, both at the northern extremity of the arc and at Arbury-hill, but more particularly at the first-mentioned station. If this were partly the case, and both Dunnose and Arbury-hill were free from any such prevailing cause, the total arc must be too great, if taken at 2° 50′ 23″.38, by about 8″, nearly answering to 2″ on each degree. A deviation of 8″ from the true vertical is a large quantity; nor can the cause of it be assigned, unless it be also supposed, that the matter producing that deflection extends in a southern direction *beyond* Arbury-hill. If the error, though not probable, as above observed, be supposed to exist at Dunnose, it must amount to more than 10″; and that too from the effects of attraction in a southern direction, where the deficiency of matter would lead us to believe the reverse would happen.

"I am perfectly aware that it is possible to state a case, in which the plumb-line of a sector would deviate from the true vertical by such a quantity. Thus, for instance, in a chalky county, like the southern part of the kingdom, if the instrument were set up adjoining the terminations of two strata running east and west, one of chalk, and the other of much denser materials, the effect would be as we have found it. But, at Dunnose, this argument does not apply; nor is there reason to believe, from external appearances, that it will do so, with regard either to Arbury-hill, or the northern extremity of the meridional line.

"It was the discovery of the disagreement between the subtense in the heavens, of the whole arc, and its corresponding terrestrial one, with those of its parts, which led me to apply to his grace the duke of Marlborough, for the observations made at Blenheim on γ Draconis, or some other star. His lordship's compliance with my request is shewn, from the table of the results, to be serviceable; as the arc contained between the observatory at Blenheim and Dunnose, deduced from his grace's observations, and those made at the latter place, with the meridional distance 446,498 feet, give 60,890 fathoms, for the length of the degree on the meridian in latitude 51° 13′; which agrees nearly with the length of the degree at the middle point between Greenwich and Dunnose. However, under all considerations of the means by which the degree in 51° 13′ has been obtained, I am inclined to believe there is an uncertainty in it, of 6 or 7 fathoms, answering to about $\frac{1}{2}$″ in latitude.

"But, if the measured space between his grace's observatory and Dunnose, with its amplitude, (1° 13′ 19″.69) be used in finding the meridional distance of the whole arc, (its corresponding amplitude,) we shall get 2° 50′ 11″.80 for its subtense; which argues a deflection from the vertical at Clifton = 11″.79. If the meridional distance between Dunnose and Greenwich be used, we shall, from the same mode of proceeding, make it = 10″.3. In short, the general tenor of the observations seems to prove, that the plumb line of the sector has been drawn towards the south at all the stations; and that by attractive forces, which increase as we proceed northward. On a further prosecution of this survey, the zenith sector will be taken forward in that direction, which will afford an opportunity of throwing further light on this interesting subject. But meridional operations carried on in insular countries, are not so likely to afford just conclusions with regard to the different lengths of the degrees, as the same operations conducted in places very remote from deep seas.

"From the late operations of the French academicians it appears, that the meridional distance between Dunkirk and Barcelona is 275,792.36 modules, the metre being 443.296 lines of the Peru toise = 0,256,537th part of the module, at the temperature of melting ice. This meridional distance, therefore, converted into English feet, is 3,527,921. The distance between Dunkirk and Paris is 133 758 feet, and the distance between Paris and Greenwich is = 963,954 feet; therefore, 830,196 feet is the distance between Greenwich and Dunkirk. The distance between Greenwich and Clifton is 722,641 feet; hence, 4,411.968 feet is the meridional distance between Clifton and Barcelona. The latitude of Barcelona is 41° 21′ 48″.8; the latitude of Greenwich is 51° 28′ 40″; and if to this latitude we add 1° 58′ 51″.59, the arc between Clifton and Greenwich, we shall get 53° 27′ 31″.59 for the latitude of Clifton: and shall then have the difference of latitude between Barcelona and Clifton = 12° 5′ 42″.79, something more than the 30th part of the whole circumference of the earth. With this difference of latitude, and the above-mentioned distance, we shall get 60,795 fathoms, for the mean length of a degree on the earth's surface, in latitude 47° 24′. The latitude of Paris is 48° 50′ 15″; this, with that of Clifton, gives 4° 37′ 16″.59 for the difference between their parallels. The meridional distance is 1,686,595 feet; hence, 60,825 fathoms is the length of the degree in latitude 51° 9′."

Of the trigonometrical Operations in France, since 1790.

While this great work was carried on in England, a similar one was undertaken in France, and on a larger scale, as the arc measured in that country began at Dunkirk, and extended beyond the frontiers to Barcelona in Spain. The immediate purpose of this operation was to obtain a standard measure, which should not be arbitrary, but founded on some permanent quantity afforded by nature. Many learned men were advocates for taking the length of the pendulum as a standard; but after much deliberation, it was resolved to adopt the ten millionth part of the quadrant of the meridian for the unit, which was to be called a metre, and from this all other measures were to be derived. See Measure.

To obtain this standard it was requisite to institute a new series of observations, to determine the magnitude and figure of the earth in a more satisfactory manner than had hitherto been done; and preparations were made for again repeating the whole process for the measurement of an extensive arc of the meridian.

The most remarkable difference in the mode of conducting the surveys in the two countries, was in the instruments employed for the measure of the angles. The only one used by the French astronomers was the repeating circle of Borda. We are fully inclined to give credit to all that is related of the extraordinary accuracy of this ingenious instrument; at the same time, we are disposed to think the theodolite of Ramsden a preferable instrument for great national surveys, where circumstances will permit its use. The superiority of the theodolite consists in its size, the great power of its telescope, and the facility with which all azimuthal angles are observed with it, without any correction; as it combines all the verifications of a transit instrument, the pole star can be brought to the horizon without sensible error, and its azimuth serves to give the direction of the sides of the triangles in a manner infinitely more exact than we believe can be done by any management of a repeating circle. On the other hand, the latter instrument supplies the place of a zenith

zenith fector; and from its being light and portable, admits of its being taken into fituations inacceffible to a larger inftrument. Whoever perufes the account of the French furvey, will at once perceive that fo large an inftrument as the theodolite of Ramfden would have been totally ufelefs in that country. The repeating circle requires a great number of corrections, but thefe are rendered eafy by the means of tables; and it muft be obferved, that many of the corrections ufed by the French aftronomers do not depend on the nature of their inftrument, but on its pofition, which was feldom or never that of the centre of the ftation; the difturbed ftate of the country, and the want of fufficient pecuniary affiftance, prevented them from erecting fignals at felect ftations, as was practifed in this country; on the contrary, they were obliged to felect fuch fteeples, towers, windmills, and other confpicuous buildings as the country afforded, which were often very inconveniently difpofed for the reception of their inftrument, fmall and portable as it was.

The committee appointed by the ancient academy, confifting of Lagrange, Laplace, Monge, and Condorcet, publifhed their report on this intended operation in the memoirs of the academy for 1788. It was propofed, among a variety of other objects relative to the new meafures, to meafure an arc of the meridian from Dunkirk to Barcelona, exceeding $9^{\circ}\frac{1}{2}$. This arc had the advantage of being terminated at each extremity by the level of the fea, and it was extended beyond the Pyrenées, that the influence of mountains on the plumb-line might be avoided.

Thofe to whom the execution of this undertaking was committed were inftructed to determine the latitude of Dunkirk and Barcelona, and other intermediate ftations, to re-meafure the ancient bafes, to verify again the former triangles, and to extend them to Barcelona. From the fuccefsful trial that had been made of the repeating circle in 1787, it was again adopted, but of rather larger dimenfions; and four of them were conftructed by Le Noir, from 14 to 18 inches diameter, to be employed in this occafion. The execution of the whole was entrufted to Mechain and Delambre. The former undertook the fouthern part, from Rodez to Barcelona; the latter the northern, from Rodez to Dunkirk.

One of the laft acts of the unfortunate Louis XVI. was a proclamation to place thefe aftronomers and their fignals, inftruments, &c. under the fpecial protection of the adminiftrative authorities; but the paffports of this expiring government only rendered them objects of greater fufpicion, and increafed their difficulties and dangers.

Mechain, after encountering feveral vexations interruptions in the vicinity of Paris, at length was fortunate enough to arrive within the Spanifh frontiers, where, in the neighbourhood of Barcelona, he completed feveral triangles; and, by the end of October 1792, had terminated the angles at fort Montjouy, the fouthern extremity of the arc: here he refolved to wait during the winter, and devote it to obfervations for determining the latitude and azimuth of this ftation.

Delambre began his obfervations in the neighbourhood of Paris, in the fummer of the year 1792, and on the memorable 10th Auguft, ignorant of what was paffing at Paris, he went after dark to his ftation; but inftead of feeing the fignal lamp lighted on Montmartre for his obfervation, as had been previoufly agreed, he beheld the flames from the palace of the Thuilleries. It was in the dreadful period of alarm and difmay which followed, that this indefatigable aftronomer began to obferve the feries of triangles to the north of Paris: at almoft every village he was arrefted, and obliged to explain to the populace the ufe of his inftruments and the nature of his miffion; and in more than one inftance, where this lecture did not fuit the tafte of the mob, he very narrowly efcaped deftruction. It feems to have been deftined that the great undertakings of the French, relative to the meafurement of the earth, fhould be accomplifhed under circumftances peculiarly unpropitious. But the inclement frofts of the arctic circle, and the hurricanes of the Andes, which fo much diftreffed their former aftronomers, feem to have been mild and benignant agents of nature, when compared to the violence of a ferocious and exafperated mob.

Yet, amidft all thefe ftorms, with a coolnefs and intrepidity truly admirable, had Delambre fucceeded in completing a great number of triangles, when he was removed from his fituation by a decree of the committee. This decree, after fetting forth the importance to the amelioration of public opinion, *efprit public*, that perfons concerned in thefe operations fhould be diftinguifhed by their republican virtues, and hatred to kings, ordains that Borda, Lavoifier, Laplace, Coulomb, Briffon, and Delambre, fhould ceafe to belong to the commiffion. This order is figned Barrere, Robefpierre, Billaud-Varenne, Couthon, Collot d'Herbois, &c.

Mechain for a long time had not been heard of, and to this circumftance he was indebted for not being included in the profcribed lift, as it was feared he might take refuge with his inftruments in Spain. It is faid that very advantageous offers were made him to this effect, which, after the fuppreffion of the academies in France, he might without any great impropriety have liftened to; but he was too much attached to the great work in which he was engaged to be influenced by any other views that were not directed to its accomplifhment. Notwithftanding the war between the two countries, he continued his obfervations, but not without frequent interruptions; and before he had concluded his triangles, he was detained as a prifoner by the Spanifh government, but permitted to choofe his refidence, which he fixed at Barcelona, that he might be as near as poffible to the fort of Montjouy, which was the extreme ftation of the arc, and whofe latitude he had previoufly determined. Being denied accefs to the fort, he employed himfelf in determining the obliquity of the ecliptic, by folftitial altitudes of the fun, taken with the repeating circle, and connected his obfervatory with the fort trigonometrically, an inftructive example of the triumph of fcience over fufpicious ignorance. The Spaniards probably thought that the determination of the latitude and longitude of a fort was a preliminary ftep to the capture of it. Mechain continued here reduced to a very diftreffed condition; what remained of his finances was confifcated as French property. After a confiderable time, he at laft was fuffered to embark for Genoa.

After the death of Robefpierre, and under the government of the executive directory, they were again, after an interruption of eighteen months, permitted to refume their labours. This recommencement did not take place, however, under very aufpicious circumftances; Delambre was once detained a month at a town for want of money to defray his expences, as he was only furnifhed with affignats, which were fo much depreciated, that in fome places nobody would take them at any difcount. With thefe and a thoufand other difficulties, they fuccefsfully ftruggled and accomplifhed the tafk committed to them, with a precifion, which, if it had been executed under every favourable circumftance, would have deferved our utmoft admiration. Mechain carried his feries of triangles over the moft inhofpitable receffes of the Pyrenées, till he finally united them with thofe of Delambre in the fouth of France.

He returned to Spain, and was arduoufly engaged in continuing

tinuing the meridian to the Balearic isles, in the Mediterranean, when, overcame and exhausted by the extreme fatigue he had endured, this excellent astronomer expired at Castellon de la Plana, in the kingdom of Valencia, in the autumn of the year 1805.

The base originally chosen by Picard, and so often remeasured, was now abandoned, as several of the neighbouring steeples and signals had gone to decay. Two new bases were chosen; one between Melun and Lieursaint, the other near Perpignan. The first measured 6075.90 toises, the latter 6006.247 toises. They were measured with rods of platina, their ends being placed near each other, and the distance measured by a micrometer; instead of applying thermometers to the rods, a brass scale with a vernier was affixed to each rod, so as to shew its relative state of expansion when compared to brass during the operation. When the length of one of these bases was inferred by computation from the other, it did not differ 12 inches from the measurement, though the distance between them was between four and five hundred miles.

The latitudes of three intermediate points were obtained in the course of the survey, besides the latitudes of Dunkirk and Montjouy. These with the contained arcs expressed in modules were as follows:

					Modules.	Metres.
Dunkirk	51°	2′	10″			
				D P	62472.59	= 243522.1
Pantheon, Paris	48	50	49.7			
				P E	76145.74	= 296821.9
Evaux -	46	10	42			
				E C	84424.53	= 329093.2
Carcassone	43	12	54			
				C M	52749.48	= 205621.3
Montjouy	41	21	45			
					Total Arc =	1075058.5

The degrees derived from these intermediate observations on different parts of the arc, varied almost as much as in the English survey, and in a manner equally irregular, and contrary to every received hypothesis of the earth's figure. The decrease of the degrees towards the northern extremity was at first very slow; beyond Evaux they decreased very rapidly; and beyond Carcassone they again diminished more slowly. The ellipticity deduced from the measures in France, independent of those obtained in other countries, is $\frac{1}{150}$, the same that was deduced from the meridional and perpendicular degree in the south of England. As this result was supposed to interest equally all civilized nations, a commission was appointed, consisting of the members of the Institute, and a number of learned and scientific men from different parts of Europe. Before this commission all the papers and documents of the respective observers were laid, with an account of the measurement of the bases, and of all the corrections and computations that had been applied. The commissioners themselves drew up the table of triangles, from which the arc of the meridian was ultimately to be computed.

The triangles are given by the French astronomers in a form somewhat different from those in the English survey. By referring to these it will be seen that general Roy, when he first took notice of the spherical excess of three angles above two right angles, applied the correction arising from it, in rather an incorrect manner (as will be fully explained hereafter). Colonel Mudge reduces his angles to chord lines, which method is likewise adopted by Delambre. But as there are three different ways in which a triangle on the surface of the earth may be computed, the French have given their triangles in three different forms, suited to the three modes of computation, which should all give the same result, as they are all three rigorously exact, at least in triangles of small extent compared with the whole earth.

It would occupy more space than we could allow to insert the whole chain of triangles from Barcelona to Dunkirk, but we shall annex the 36 triangles which connect Paris and Dunkirk, which will complete the series from Greenwich to Paris, and at the same time afford the mathematical reader a valuable specimen of the most accurate methods of preparing these triangles for computation.

The final deduction that was obtained from this laborious investigation, was as follows.

Ellipticity or compression	-	$\frac{1}{334}$.
Longer semi-axis of the earth		3271226 toises,
	or	6375737 metres,
		20918830 English feet.
Shorter semi-axis	- -	3261432 toises,
		6356649 metres,
		20855922 English feet.

The quadrant of the meridian contained 5130740 toises, consequently the metre was equal to 443,295,986 lines.

Table of thirty-six Triangles, which connect the Tower of Dunkirk with the Pantheon at Paris.

The first two columns of this table require no explanation.

The third contains the observed angles, such as were decided by the commission appointed to examine the observations.

The fourth contains, under the title spherical excess, the difference between the spherical angle of the arcs, and the rectilinear angle of the chords.

The fifth contains the spherical angles corrected for computation.

The sixth contains the spherical angles diminished by their spherical excess, and are the rectilinear angles formed by the chords.

The last column contains the mean angles or the spherical angles corrected each by one-third of the spherical excess: in this state they may be calculated by the rules of plane trigonometry, as appears by a very curious theorem of Legendre. All these methods will be fully illustrated before we conclude this subject.

No. of Triangles.	Names of the Stations.	Obferved Angles.	Spherical Excefs.	Spherical Angles.	Angles of the Chords.	Mean Angles.
		° ′ ″	″	° ′ ″	′ ″	′ ″
I.	Dunkirk - - - -	42 6 9.34	−0.34	42 6 9.73	6 9.29	6 9.34
	Watten - -	74 28 44.88	−0.45	74 28 45.28	28 44.83	28 44.88
	Caffel - -	63 25 5.78	−0.39	63 25 6.17	25 5.78	25 5.78
		180 0 0.00	−1.18	180 0 1.18	0 0.00	0 0.00
	Sum of errors - -	−1.18				
II.	Dunkirk - -	46 52 0.32	−0.21	46 52 0.32	52 0.11	52 0.83
	Watten - - -	45 33 44.65	−0.23	45 33 44.65	33 44.42	33 44.37
	*Gravelines - -	87 34 15.89	−0.42	87 34 15.89	34 15.47	34 15.60
		180 0 0.86	−0.86	180 0 0.86	0 0.00	0 0.00
III.	Watten - - -	69 34 45.08	−0.54	69 34 45.38	34 44.84	34 44.82
	Caffel - - -	79 48 35.05	−0.68	79 48 35.35	48 34.67	48 34.79
	Fiefs - - - -	30 36 40.64	−0.45	30 36 40.94	36 40.49	36 40.39
		180 0 0.77	−1.67	180 0 1.67	0 0.00	0 0.00
	Sum of errors - -	0.90				
IV.	Watten - - -	74 39 23.20	−0.28	74 39 23.20	39 22.92	39 22.96
	Caffel - - -	43 37 35.73	−0.21	43 37 35.73	37 35.52	37 35.50
	*Helfaut - - -	61 43 1.78	−0.22	61 43 1.78	43 1.56	43 1.54
		180 0 0.00	−0.71	180 0 0.71	0 0.00	0 0.00
V.	Caffel - - - - -	36 10 59.00	−0.11	36 10 59.00	10 58.89	10 58.63
	Fiefs - - -	34 3 15.47	−0.12	34 3 15.47	3 15.35	3 15.10
	*Helfaut - -	109 45 46.64	−0.88	109 45 46.64	45 45.76	45 46.27
		180 0 1.11	−1.11	180 0 1.11	0 0.00	0 0.00
VI.	Caffel - - - -	29 50 27.59	−0.43	29 50 27.95	50 27.54	50 27.35
	Fiefs - - - - -	91 11 19.04	−0.93	91 11 19.40	11 18.47	11 18.80
	Mefnil - - - - -	58 58 14.09	−0.46	58 58 14.45	58 13.99	58 13.85
		180 0 0.72	−1.80	180 0 1.80	0 0.00	0 0.00
	Sum of errors - -	1.08				
VII.	Caffel - - - -	39 42 10.51	−0.51	39 42 10.51	42 10.00	42 9.91
	Bethune - - -	78 39 44.58	−0.73	78 39 44.58	39 43.85	39 43.98
	*Fiefs - - - - -	61 38 6.71	−0.56	61 38 6.71	38 6.15	38 6.11
		180 0 1.80	−1.80	180 0 1.80	0 0.00	0 0.00
VIII.	Bethune - - -	62 55 40.04	−0.16	62 55 40.04	55 39.88	55 39.84
	Mefnil - - - -	87 31 2.11	−0.27	87 31 2.11	31 1.84	31 1.91
	*Fiefs - - - -	29 33 18.44	−0.16	29 33 18.44	33 18.28	33 18.25
		180 0 0.59	−0.59	180 0 0.59	0 0.00	0 0.00
IX.	Caffel - - - -	75 53 9.51	−0.64	75 53 9.51	53 8.87	53 8.96
	Bethune - - -	37 29 18.86	−0.45	37 29 18.86	29 18.41	29 18.32
	*Helfaut - - - -	66 37 33.27	−0.55	66 37 33.27	37 32.72	37 32.72
		180 0 1.64	−1.64	180 0 1.64	0 0.00	0 0.00

The afterifk denotes a computed angle.

No. of Triangles.	Names of the Stations.	Observed Angles.	Spherical Excess.	Spherical Angles.	Angles of the Chords.	Mean Angles.
		° ′ ″	″	° ′ ″	′ ″	′ ″
X.	Helfaut	43 8 13.37	−0.28	43 8 13.37	8 13.09	8 12.94
	Bethune	41 10 25.44	−0.26	41 10 25.44	10 25.18	10 25.01
	Feifs	95 41 22.48	−0.75	95 41 22.48	41 21.73	41 22.5
		180 0 1.29	−1.29	180 0 1.29	0 0.0	0 0.0
XI.	Feifs	42 59 49.22	−0.22	42 59 49.63	59 49.41	59 49.22
	Mefnil	102 38 9.22	−0.80	102 38 9.63	38 8.83	38 9.22
	Sauti	34 22 1.56	−0.22	34 22 1.98	22 1.76	22 1.56
		180 0 0.00	−1.24	180 0 1.24	0 0.0	0 0.0
	Sum of errors	−1.24				
XII.	Fiefs	34 32 52.13	−0.34	34 34 51.42	32 51.08	32 50.93
	Sauti	54 45 9.38	−0.38	54 45 8.66	45 8.28	45 8.17
	Bonnieres	90 42 2.11	−0.75	90 42 1.39	42 0.64	42 0.90
		180 0 3.62	−1.47	180 0 1.47	0 0.0	0 0.0
	Sum of errors	+2.15				
XIII.	Bonnieres	51 56 48.69	−0.25	51 56 49.41	56 49.16	56 49.13
	Sauti	64 36 51.28	−0.29	64 36 51.99	36 51.70	36 51.72
	Beauquêne	63 26 18.71	−0.28	63 26 19.42	26 19.14	26 19.15
		179 59 58.68	−0.82	180 0 0.82	0 0.0	0 0.0
	Sum of errors	−2.14				
XIV.	Sauti	52 57 13.76	−0.18	52 57 13.04	57 12.86	57 12.85
	Beauquêne	59 3 28.53	−0.19	59 3 27.81	3 27.62	3 27.62
	Mailli	67 59 20.45	−0.21	67 59 19.73	59 19.52	59 19.53
		180 0 2.74	−0.58	180 0 0.58	0 0.0	0 0.0
	Sum of errors	+2.16				
XV.	Mailli	78 53 28.70	−0.38	78 53 28.70	53 28.32	53 28.39
	Villerfbreton	35 10 33.65	−0.25	35 10 33.65	10 33.40	10 33.35
	Beauquêne	65 55 58.56	−0.28	65 55 58.56	55 58.28	55 58.26
		180 0 0.91	−0.91	180 0 0.91	0 0.0	0 0.0
XVI.	Villerfbreton	35 4 56.87	−0.29	35 4 56.87	4 56.58	4 56.52
	Vignacourt	65 14 50.05	−0.33	65 14 50.05	14 49.72	14 49.70
	Beauquêne	79 40 14.14	−0.44	79 40 14.14	40 13.70	40 13.78
		180 0 1.06	−1.06	180 0 10.6	0 0.0	0 0.0
XVII.	Villerfbreton	99 5 50.45	−0.83	99 5 50.48	5 49.63	5 50.00
	Vignacourt	31 49 57.91	−0.30	31 49 57.92	49 57.62	49 57.47
	Sourdon	49 4 12.98	−0.23	49 4 12.98	4 12.75	4 12.53
		180 0 1.34	−1.36	180 0 1.36	0 0.0	0 0.0
	Sum of errors	+0.02				
XVIII.	Villerfbreton	60 20 43.63	−0.24	60 20 43.56	20 43.32	20 43.32
	Sourdon	52 0 56.06	−0.22	52 0 56.20	0 55.78	0 55.76
	Arvillers	67 38 21.22	−0.26	67 38 21.16	38 20.90	38 20.92
		180 0 0.90	−0.72	180 0 0.72	0 0.0	0 0.0
	Sum of errors	−0.18				

No. of Triangles.	Names of the Stations.	Obferved Angles.	Spherical Excefs.	Spherical Angles.	Angles of the Chords.	Mean Angles.
		° ′ ″	″	° ′ ″	′ ″	′ ″
XIX.	Beauquêne	52 5 16.65	−0.19	52 5 17.43	5 17.24	5 17.13
	Mailli	98 8 54.40	−0.55	98 8 55.18	8 54.63	8 54.88
	Bayonvillers	29 45 47.51	−0.17	29 45 48.30	45 48.13	45 47.99
		179 59 58.56	−0.91	180 0 0.91	0 0.0	0 0.0
	Sum of errors	−2.35				
XX.	Mailli	19 15 25.70	−0.13	19 15 24.14	15 24.01	15 23.98
	Bayonvillers	79 54 17.65	−0.18	79 54 16.09	54 15.91	54 15.92
	Villerfbreton	80 50 21.83	−0.18	80 50 20.26	50 20.08	50 20.10
		180 0 5.18	−0.49	180 0 0.49	0 0.0	0 0.0
	Sum of errors	+4.69				
XXI.	Bayonvillers	102 20 59.12	−0.15	102 20 57.90	20 57.75	20 57.81
	Villerfbreton	49 27 36.45	−0.04	49 27 35.23	27 35.19	27 35.14
	Arvillers	28 11 28.35	−0.07	28 11 27.13	11 27.06	11 27.05
		180 0 3.92	−0.26	180 0 0.26	0 0.0	0 0.0
	Sum of errors	+3.66				
XXII.	Villerfbreton	75 1 3.02	−0.30	75 1 3.02	1 2.72	1 2.76
	Sourdon	44 27 3.75	−0.22	44 27 3.75	27 3.53	27 3.50
	Amiens	60 31 54.00	−0.25	60 31 54.00	31 53.75	31 53.74
		180 0 0.77	−0.77	180 0 0.77	0 0.0	0 0.0
XXIII.	Villerfbreton	24 4 47.59	+0.07	24 4 48.74	4 48.81	4 48.59
	Vignacourt	25 10 54.43	+0.06	25 10 55.58	10 55.64	10 55.43
	Amiens	130 44 14.98	−0.58	130 44 16.13	44 15.55	44 15.98
		179 59 57.00	−0.45	180 0 0.45	0 0.0	0 0.0
	Sum of errors	−3.45				
XXIV.	Arvillers	60 29 18.51	−0.31	60 29 18.89	29 18.58	29 18.59
	Sourdon	69 17 27.78	−0.33	69 17 28.16	17 27.83	17 27.85
	Coivrel	50 13 13.48	−0.27	50 13 13.86	13 13.59	13 13.56
		179 59 59.77	−0.91	180 0 0.91	0 0.0	0 0.0
	Sum of errors	−1.14				
XXV.	Sourdon	62 33 20.65	−0.33	62 33 21.29	33 20.96	33 20.98
	Coivrel	57 10 38.17	−0.30	57 10 38.82	10 38.52	10 38.51
	Noyers	60 16 0.18	−0.31	60 16 0.83	16 0.52	16 0.51
		179 59 59.00	−0.94	180 0 0.94	0 0.0	0 0.0
	Sum of errors	−1.94				
XXVI.	Coivrel	62 21 39.67	−0.35	62 21 38.68	21 38.33	21 38.34
	Noyers	59 57 16.30	−0.34	59 57 15.31	57 14.97	57 14.97
	Clermont	57 41 8.02	−0.34	57 41 7.04	41 6.70	41 6.69
		180 0 3.99	−1.03	180 0 1.03	0 0.0	0 0.0
	Sum of errors	+2.96				
XXVII.	Coivrel	62 59 9.84	−0.37	62 59 9.47	59 9.10	59 9.12
	Clermont	58 32 27.67	−0.35	58 32 27.30	32 26.95	32 26.95
	Jonquieres	58 28 24.65	−0.34	58 28 24.29	28 23.95	28 23.93
		180 0 2.16	−1.06	180 0 1.06	0 0.0	0 0.0
	Sum of errors	+1.10				

No. of Triangles.	Names of the Stations.	Observed Angles.	Spherical Excess.	Spherical Angles.	Angles of the Chords.	Mean Angles.
		° ′ ″	″	° ′ ″	′ ″	′ ″
XXVIII.	Clermont - - - -	49 18 59.11	−0.25	49 18 58.92	18 58.68	18 58.65
	Jonquieres - - -	53 5 26.10	−0.26	53 5 25.91	5 25.65	5 25.63
	St. Christophe - - -	77 35 36.19	−0.33	77 35 36.00	35 35.67	35 35.72
		180 0 1.40	−0.84	180 0 0.84	0 0.0	0 0.0
	Sum of errors - - -	+0.56				
XXIX.	Coivrel - - - -	32 49 40.18	−0.13	32 49 39 79	49 39.66	49 39.46
	Clermont - - - -	107 51 26.78	−0.74	107 51 26.38	51 25.64	51 26.05
	St. Christophe - - -	39 18 55.21	−0.12	39 18 54.82	18 54.70	18 54.49
		180 0 2.17	−0.99	180 0 0.99	0 0.0	0 0.0
	Sum of errors - - -	+1 18				
XXX.	Clermont - - - -	54 39 58.89	−0.33	54 39 57.66	39 57.33	39 57.26
	St. Christophe - - -	87 43 29.69	−0.56	87 43 28.46	43 27.90	43 28.06
	St. Martin - - - -	37 36 36.30	−0.30	37 36 35.07	36 34.77	36 34.68
		180 0 4.88	−1.19	180 0 1.19	0 0.0	0 0.0
	Sum of errors - - -	+3.69				
XXXI.	St. Christophe - - -	62 36 58.79	−0.45	62 36 58.37	36 57.92	36 57.93
	St. Martin - - -	56 20 9.41	−0.43	56 20 9. 0	20 8 57	20 8.56
	Dammartin - - -	61 2 54.37	−0.45	61 2 53.96	2 53.51	2 53.51
		180 0 2.57	−1.33	180 0 1.33	0 0.0	0 0.0
	Sum of errors - - -	+1.24				
XXXII.	Clermont - - - -	38 1 22.80	−0.43	38 1 22.43	1 22.0	1 21.79
	Dammartin - - -	48 1 54.53	−0.48	48 1 54.16	1 53.68	1 53.52
	St. Martin - - -	93 56 45.71	−1.01	93 56 45.33	52 44.32	56 44.69
		180 0 3.04	−1.92	180 0 1.92	0 0.0	0 0.0
	Sum of errors - - -	+1.12				
XXXIII.	Clermont - - - -	65 57 33.39	−0.67	65 57 33.31	57 32.64	57 32.58
	Jonquieres - - - -	80 45 32.25	−0.91	80 45 32.16	45 31.25	45 31.44
	Dammartin - - -	33 16 56.78	−0.59	33 16 56.70	16 56.11	16 55.98
		180 00 2.42	−2.17	180 0 02.17	00 0.0	00 0.0
	Sum of errors - - -	+0.25				
XXXIV.	Jonquieres - - -	36 15 48.57	−0.66	36 15 48.57	15 47.91	15 47.77
	Dammartin - - -	81 18 52.89	−1.03	81 18 52.89	18 51.86	18 52.09
	St. Martin - - -	62 25 20.94	−0.71	62 25 20.94	25 20.23	25 20.14
		180 0 2.40	−2.40	180 0 2.40	0 0.0	0 0.0
XXXV.	St. Martin - - -	76 2 30.83	−0.72	76 2 31.25	2 30.53	2 30.66
	Dammartin - - -	57 20 17.99	−0.57	57 20 18.42	20 17.85	20 17.82
	Pantheon - - - -	46 37 11.69	−0.50	46 37 12.12	37 11.62	37 11.52
		180 0 0.51	−1.79	180 0 1.79	0 0.0	0 0.0
	Sum of errors - - -	−1.28				

 Measure

Measure of a Degree in Sweden.

Mr. Swanberg's account of the trigonometrical operations in Lapland, for the purpose of determining the value of an arc of the meridian, is a work that would at any time have excited considerable attention from the importance of its object, and the correctness of the operations it details. But at present it derives additional interest from the difference between this degree, and that formerly measured in the same country by Maupertuis, Clairault, &c. and from its agreement with that which results from the late operations carried on in France and Spain.

The summer of the year 1801 was entirely employed by the Swedish astronomers in the choice of stations, and the construction of signals. They then returned to Stockholm, to await the arrival of the circle constructed for them by M. Lenoir, and the standards of the double metre, and of the toise employed in Peru, which the members of the Institute sent to the academy at Stockholm.

The measure of the base was begun February the 22d, at Niemisby, and finished April 11th at Poiki Tornea. They were then obliged to wait for the summer to measure the angles. June, July, and August were employed in these operations. Mallorn is the most southern, and Pahtavara the most northern point of these triangles, which amount to 31 in number, including some subsidiary triangles of verification. The new arc is 1° 37′ 19″.56, that of 1736 was 57′ 27″ or 30″: the difference is about 39′ 40″.

The Swedish astronomers, in that part of the arc which coincided with the French, have employed the same stations for their signals, except the Finland church at Tornea, which they have substituted for the church of the town. The southern points of the chain of triangles are in the islands of the gulf of Bothnia, and diverge but little from the meridian of Kittis, to which the French astronomers reduced all the sides of their heptagon.

They commenced the astronomical observations the 7th of September, at Mallorn, by observing the zenith distance of the pole-star. But they did not consider these observations as correct, from some irregularity in the rate of the clock. Those to be relied on do not commence till October the 5th, and terminated the 24th. The observations of the pole-star at Pahtavara commenced the 10th of December, and continued the 11th, 18th, 23d, 24th, and 25th; on the 26th and 27th they observed the same star below the pole, which they had not been able to do at Mallorn. The azimuthal observations were made at both extremities of the arc; but M. Swanberg has only calculated those of Mallorn, because at Pahtavara he had not ascertained the rate of his clock accurately enough for a calculation, in which the hour angle is so important an element. He thought the observations at Mallorn more than sufficient, considering the slight effect a small error in the azimuth could produce on an arc of the meridian.

The base was measured with iron rods, or bars, rather more than six metres in length, covered at each extremity with two plates of silver, to prevent the effect which moisture might have on the iron. Two lines were drawn on these plates, the interval between which was exactly six metres. The ends of these rods were placed side by side, during the measurement, so that these lines precisely coincided. This measurement being performed in the middle of winter, they found the atmosphere so much obscured by continual fogs, that they could not from one end of the base see the signal placed at the other. This compelled them to trace the base by means of intermediate pickets. M. Swanberg computes the errors that might possibly arise from this method, and supposes the base to be a polygon inscribed in a logarithmic spiral; the correction appears to be too small a quantity to deserve notice.

The planks which supported the iron rods being elevated half a metre from the surface of the ground, they made use of a brass pendulum furnished with a level, to ascertain the spot, where they left off, that they might recommence from the same place, as the winds which blew continually would have rendered a plumb-line of little or no use. When they quitted their labours in an evening to return home, they first made a heap of snow, which they rendered as compact as possible by pressure; and on this placed a deal tablet, which was surrounded with snow to render it immoveable, and on which they marked the point where they quitted their operation. The bulb of the thermometer, which indicated the temperature of the rods, was in contact with the iron, and it was by no means an extraordinary phenomenon for the mercury to descend 30° below the freezing point.

M. Swanberg imagines that he began his base very nearly at the same spot with the French academicians. But it is the opinion of M. Delambre (who is in possession of a work by M. Outhier, containing particulars that M. Swanberg was unacquainted with), that the new base is four feet shorter at this end than the old one. There is no rock at the northern extremity, and their researches to find some vestiges of the old termination were totally useless; as M. Maupertuis has left no indication of this spot.

The abbé Outhier says, that the French base terminated in a signal at the northern extremity; and that the marks were crosses, but made on the bark of four fir trees, two on each tree, one at the height of a man, the other near the ground. These trees formed a quadrilateral figure, the intersection of the diagonals of which was the centre of the signal. It is possible that these trees might no longer exist: but one of them was remarkably situated; it stood near the bank of the river, and touched the inclosure of a field.

Now M. Swanberg's base terminated in a field, which he believes to be the same. It was divided between the peasants of the villages of Sarkivara and Rahtola; and as there was no rock or stone on which he could mark his boundary, he stopped at the inclosure which separated the possessions of these two villages, concluding that interest would induce them to repair this boundary, whenever it was injured. To preserve the precise point at which the base terminated, he had a pit dug about a metre and a half in depth immediately below the inclosure. They then charred the surface of a thick trunk of a fir tree, to render it less liable to decay, and placed it in the pit, surrounded with gravel and pebbles, to render it immoveable. Its centre was pierced with a thick brass wire, and it was covered with iron plates, on which a cross was engraved, the centre of which corresponded to that of the trunk.

M. Delambre thinks, that if this inclosure was the same with that described by the abbé Outhier, the new base would be 10 or 12 toises shorter than that of 1736, supposing 11 toises, adding the 4 toises at the other end, we should have about 12 toises, that the new base would be shorter than the old one. But M. Swanberg's is 7414.5 toises, the other only 7406.8 toises, which is, on the contrary, less by 8 toises.

M. Delambre suspects that the new base was not so oblique to the river as the other; and concludes, after a very careful examination of the question, that neither of the extremities of M. Swanberg's base coincided with that of M. Maupertuis. And it is his opinion that the difference between the degree of 1802 and that of 1736, does not arise from any error in the trigonometrical operations, but depends wholly

wholly on an error in the amplitude of the arc which he estimates at 10″ or 12″.

These are the sides common to both the operations.

		Swanberg.	Outhier.
Base - - - - - - -		7414.5	7406.8
Northern extremity to	Avansaxa	1186.0	1207.3
Southern extremity	- Avansaxa	7240.0	7242.8
Cuitaperi	- Avansaxa	8636.9	8660.0
Cuitaperi	- Horrilankero	13396.1	13432.0
Kakamavara	- Horrilankero	19066.5	19073.0
Kakamavara	- Niemisby	25047.0	25053.0
Horrilankero	- Niemisby	7028.4	7029.0
Horrilankero	- Avansaxa	7447.9	7451.4
Pullingi	- Avansaxa	14271.0	14277.3
Pullingi	- Horrilankero	11529.3	11558.5
Pullingi	- Niemisby	8757.6	8768.8
Pullingi	- Kittis	10672.3	10676.0
Niemisby	- Kittis	13449.1	13560.0

The observations which were made to determine the latitude of the extreme stations gave likewise, with the greatest accuracy, the declination or polar distance of the pole-star. Mr. Swanberg deduces it from his observations 1° 45′ 36″.2, for the beginning of year 1800; Delambre and Mechain, from the mean of some hundred observations, 1° 45′ 35″.4; by Mr. Pond's tables in Philosophical Transactions inserted under DECLINATION, it is 1° 45′ 36″; perhaps the position of no star was ever so well known. The result of Mr. Swanberg's measurement and calculation is as follows.

The length of the base reduced to the level of the sea, at the temperature of zero, was 7414.4919 toises, or 14,451.116 metres. The distance between the parallels of Pahtavara and Mallorn 92,767.981 toises or 180,827.68 metres.

The latitude of the centre of the signal at Mallorn was 65° 31′ 30″.26, and at Pahtavara 67° 8′ 49″.83. Therefore the latitude of the middle point was 66° 20′ 10″.04; the amplitude of the whole arc 1° 39′ 19″.56; and the value of the degree 57,196.159 toises. The most probable ellipticity deduced from comparing these determinations with those made in Peru, the East Indies and France, is $\frac{1}{323.065}$, and the radius of the equator 3371452 toises.

The degree of Maupertuis exceeds that of Mr. Swanberg 224 toises. If the error had been the other way, and if at the same time the astronomers at Peru had committed an equal error in their determination, the polar axis would have appeared the longest.

The account which Mr. Swanberg has published of this operation is enriched with a number of valuable investigations of various formulæ, for the computation and correction of spheroidical triangles, and of the different parts of a meridian line.—It is entitled "Exposition des Operations faites en Laponie, pour la Determination d'un Arc du Meridien, en 1801, 1802, & 1803, par Messieurs Ofverbom, Swanberg, Holmquist, et Palander. Redigée par M. Swanberg."

The mathematical class of the national institute, as a mark of respect to M. Swanberg, for the skill and analytical knowledge displayed in the above work, voted him the medal founded by M. De la Lande. *v.* Con. des Temps 1808, from which this account was chiefly taken.

Measurement of a meridional and perpendicular Arc in India.

In the Asiatic researches, (vol. viii.) major Lambton has given a very circumstantial account of the measurement of an arc of the meridian on the coast of Coromandel, in the latitude 12° 30′. This operation formed part of an extensive survey, which is intended to be carried across the peninsula of India. It appears to have been conducted in a very intelligent and careful manner. The method the author has followed so exactly resembles that of general Roy, and colonel Mudge, that it requires but little description. The base was measured with a steel chain, made by Ramsden, and its rate of expansion ascertained by pyrometrical experiments.

It commenced at St. Thomas's mount, near fort St. George, and extended 40006.44 feet, in a direction nearly south.

The angles were measured by a theodolite extremely similar to that used in the English survey; it was constructed by Mr. Cary, an artist who was brought up under Ramsden, and nothing inferior to him in the beauty and delicacy of his workmanship.

The triangles which connected the extreme stations were 32 in number; the observations of their angles seem to have been taken with great accuracy. The joint errors of the three angles in three instances amount to 5″; in general they are under 2″, so that the error of a single angle never probably exceeded 2″, and was often within that quantity. The southern extremity of the arc was at Trivandiporum, in lat. 11° 44′ 52″.6, near Pondicherry; the northern at Paudree, lat. 13° 19′ 49″.2.

The observations made to determine the amplitude of the arc were made with a zenith sector, constructed by Ramsden. They consist of zenith distances of Aldebaran, taken at each extremity. The coincidence of the observations that are published is satisfactory enough; but as some considerable previous disagreement is alluded to, and as it is possible for a sector to give observations which accord very well with each other, but affected with some common error, if there is any part of the process on which we should hesitate to place implicit reliance, it is this; but in making this remark we are very far from imputing the smallest inattention to the ingenious officer, who has conducted the whole of this operation in a manner that reflects great honour on himself and his profession.

The direction of the meridian was determined by observations of the pole star at its greatest elongation, as practised so successfully by general Roy; this method was likewise used to obtain the azimuthal angles for computing the value of a perpendicular degree. These were taken at Carangooly hill, and Curnatighur, two stations nearly east and west of each other, and distant about fifty-five miles.

In that part of the computation where it was necessary to assume some hypothesis of the earth's figure, the author takes the spheroid resulting from the meridional and perpendicular degree measured in England. This seems to have been injudicious; it would have been more strictly correct to have taken, for a second approximation, the spheroid derived from his own observations; but as he himself observes, the error arising from an erroneous supposition would be very small. The final result which major Lambton obtains is, that the length of the meridional degree in latitude 12° 32′ is 60,495 fathoms, and perpendicular degree 61,061 fathoms.

We have now brought the historical part of our subject to a conclusion, and have enumerated every operation instituted for the measurement of the earth that is found upon record, from the earliest ages to the present day.

It is evident that the late attempts to investigate the exact figure of the earth by actual measurement have not been attended with the success that might be expected, when we consider the exquisite construction of the instruments that have been contrived for this purpose, the intelligence that has

has been evinced in the uſe of them, and the ſcrupulous accuracy with which the obſervations have been computed. But notwithſtanding the ſanguine hopes that were entertained of removing every doubt on this queſtion, have been greatly diſappointed, yet the information we have obtained by theſe operations is by no means inconſiderable. The remaining uncertainty is now reſtricted within very narrow limits, and we may conclude with confidence that the errors of obſervation are no longer concerned in the anomalies that yet remain to be explained. Two cauſes are ſuggeſted as moſt likely to produce the diſcordance: either a great irregularity in the actual figure of the earth, or an extremely variable denſity of the materials that lie beneath its ſurface. Both theſe cauſes are probably concerned, but what preciſe ſhare is to be attributed to each, future obſervations alone can determine.

This ſubject will be again reſumed under *figure of the* EARTH, to which the reader is referred for an account of the other methods that have been employed in the ſolution of this problem.

The great improvements that have been made in the conſtruction of inſtruments deſigned for operations of this nature, have been the means of creating almoſt a new ſcience.

To derive all poſſible advantage from obſervations of ſuch extreme preciſion, it was requiſite to deviſe new formulæ, new modes of calculating the triangles, and many new corrections that were either imperfectly applied, or totally neglected by former obſervers. For theſe valuable additions to the ſcience of practical geometry, we are indebted to ſome of the firſt mathematicians of the age. They are to be found diſperſed in the tranſactions and memoirs of different learned ſocieties, and in the accounts of the ſurveys above enumerated.

Profeſſor Playfair has given a complete inveſtigation of the formulæ requiſite for calculating the different parts of a meridian line, and other circles on a ſpheroid. (See Edin. Phil. Tranſ. vol. v.) In the Engliſh ſurvey, a method entirely new, of calculating ſpheroidical triangles, is given by Mr. Dalby, and the account of this whole work begun by general Roy, and continued by colonel Mudge, is in itſelf a moſt complete treatiſe on the ſcience of trigonometrical ſurveying. The French method of obſervation neceſſarily required corrections of a more intricate nature than ours. And Delambre, with the account he has publiſhed of his own obſervations, has given a great number of practical rules, which, though derived from the moſt profound analyſis, he has reduced to ſuch a convenient form, that they may be employed by perſons who have acquired only a moderate ſhare of mathematical knowledge. La Place and Legendre have likewiſe both eſſentially contributed to the improvement of this ſcience.

We have hitherto entered but little into the mathematical part of this ſubject, not becauſe it was thought foreign to the plan of this work, but that the narrative might be given in as uninterrupted a form as poſſible. But as we are deſirous that nothing ſhould be omitted that relates either to the theory and practice of aſtronomy, or the ſciences connected with it, we propoſe to ſubjoin, by way of appendix to this article, a ſhort treatiſe on that part of geodetical trigonometry, that is more immediately applicable to the meaſurement of degrees, and other queſtions connected with the figure of the earth.

For the other methods of determining the figure of the earth, ſee PENDULUM, PARALLAX, &c.

On the Method of obſerving and correcting the Angles.

The angles may be obſerved either with a theodolite, or, what is nearly the ſame, a portable aſtronomical circle, or with the repeating circle of Borda.

A circular inſtrument, with two microſcopes to its azimuth circle, will give two meaſures of the angle required without changing the poſition of the whole inſtrument; namely, one by each microſcope, but with three verniers we obtain ſix meaſures of the ſame angle. Three verniers are therefore better than two microſcopes.

If this inſtrument be placed in the centre of the ſtation, no corrections will be required, except ſuch as relate to the ſpherical exceſs, or reduction to the chord, according to the mode of computation adopted, as will be explained hereafter; but if the inſtrument be placed out of the centre of the ſtation, a correction muſt be applied, as will be explained in the directions for the management of the repeating circle.

If the angles are taken with the repeating circle, ſeveral corrections will be required, ſome depending on the mechanical conſtruction of the inſtrument, and others on its poſition: the nature and method of application of theſe we ſhall endeavour to explain.

Under CIRCLE and DECLINATION, a full account has already been given of the mechanical conſtruction of this inſtrument, of the requiſite verifications, and mode of uſing it for aſtronomical purpoſes. It now only remains to deſcribe the method of employing it for geodetical obſervations.

The method of obſerving an angle between two objects with the repeating circle is as follows:

Firſt, bring the plane of the circle into the plane of the angle to be obſerved; if this is rightly performed, the interſection of the wires of the micrometer of the moveable teleſcope ſhould paſs over each object in its revolution round its centre. To effect this readily requires a little dexterity and practice. The plane of the inſtrument, when vertical, ſhould firſt be placed in a poſition nearly between the two objects, then inclined with the hand till the two objects ſeem to the eye equally diſtant from the plane of the circle. The inſtrument is then to be turned round its vertical axis, till one object is brought into the front, or upper teleſcope fixed at zero. The back or lower teleſcope ſhould be brought to the other. Then by the joint action of the feet ſcrews, and a ſmall motion, if requiſite, in azimuth, the two objects may be biſected by each of the micrometers. The upper teleſcope being brought, as above, to the left, and the lower to the right hand object, the firſt part of the operation will be accompliſhed. Then, without altering the relative poſition of the teleſcopes, the circle is to be turned towards the left by its general motion, till the under teleſcope is directed to the left hand object; the upper teleſcope is then to be releaſed, and turned round on the inſtrument, till it is directed to the right hand object. When each ſignal is accurately biſected at the ſame time, one obſervation is complete, and the verniers will ſhew the double of the meaſured angle. This is to be repeated till a ſufficient degree of certainty is obtained.

We ſhall give an example of an angle meaſured by an 18 inch circle, conſtructed by Mr. Troughton.

No. of Obſ.	Angle given by Inſt.	Angle deduced.
2	127° 7′ 45″	63° 33′ 52″.5
4	254 15 24	63 33 51
6	21 23 00	63 33 50
8	148 30 30	63 33 48.7
10	275 38 10	63 33 49.3
12	42 45 50	63 33 49.1
14	169 53 20	63 33 48.6
16	297 00 50	63 33 48.5
20	191 16 17	63 33 49

Correction

Correction for the Eccentricity of the lower Telescope.

When we begin the obſervation of an angle A C B, (*Pl.* VII. *fig.* 58.) the upper teleſcope is directed to the object A, to the left, in the direction C A. If the lower teleſcope was concentric, we ſhould direct it towards C B, and the intercepted arc would give upon the limb the meaſure required. But, on account of the eccentricity, C D, the lower teleſcope, which is fixed in D, takes the direction D B. Afterwards, when we direct the lower teleſcope to A, the point D, by the movement of the inſtrument on its pivot, is tranſported to E, and the lower teleſcope takes the direction A E; ſo that the motion given to the inſtrument is equal to the $\angle$ D C F, and not to the $\angle$ A C B.

Now $DGE = ACE - ACD = ACE - BCD - BCA = ACE - BCD + BCA = (90° - A) - (90° - B) + BCA = 90° - A - 90 + B + BCA = BCA + B - A = BCA + \frac{CD}{CB} - \frac{CE}{CA}$; for the $\angle$'s A and B being very ſmall, we may uſe the ſines inſtead of the arcs. The upper teleſcope is thus turned to the left out of the $\angle$ A C B, a quantity $= BCA + \frac{CD}{CB} - \frac{CE}{CA}$; then, to bring it back to B, it muſt deſcribe $ACB + \frac{CD}{CB} - \frac{CE}{CA} + ACB = 2ACB + \frac{CD}{CB} - \frac{CE}{CA}$; then, taking half the arc meaſured on the limb, we find $ACB + \frac{CD}{2CB} - \frac{CE}{2CA} = \frac{1}{2}$ (arc meaſured); then $ACB = \frac{1}{2}$ (arc meaſured) $+ \frac{CE}{2CA} - \frac{CD}{2CB}$. To find A C B, we muſt add $\frac{\frac{1}{2}\text{ eccentricity}}{G} - \frac{\frac{1}{2}\text{ eccentricity}}{D}$: D is the diſtance C B, from the object B, which is to the right, and G, the diſtance *e* A, from the object A, which is towards the left. In the figure, the eccentricity is to the left; if it had been to the right, it would have been negative, and the correction would have had contrary ſigns. The correction is always $= \frac{1}{2}$ the eccentricity, reduced to ſeconds, and divided by the diſtance of the object on the ſame ſide with the eccentricity, minus the $\frac{1}{2}$ eccentricity, divided by the diſtance from the other ſide, relatively to the eccentric teleſcope.

In circles conſtructed in this country by Mr. Troughton, the eccentricity of the lower teleſcope is one inch and four tenths, and $\frac{1.4\text{ inches}}{1\text{ fathom}} = \frac{1}{103}$: this quantity, reduced to ſeconds, will be $2002''.5 = \frac{206264.8}{103} = \frac{R''}{103}$; therefore, the correction will be $\frac{2002''.5}{G} - \frac{2002''.5}{D}$. The following table, which is calculated for the above-mentioned eccentricity, is of very eaſy application.

With the diſtance of the object, which is on the ſame ſide with the eccentric teleſcope, that is, the diſtance of the left-hand object in our inſtruments, enter the table, and take a correction, to which you will prefix the ſign +. With the diſtance of the right-hand object, take a ſecond correction, which is to have the ſign —.

Example. Suppoſe the diſtance of the left-hand object to be 5000 fathoms, and the right-hand object to be diſtant 22,000 fathoms, and the eccentricity to the left, the diſtance of the object to the left = 5000 fathoms gives - - - + 0.40
Right 22,000 fathoms - — 0.09

Total correction - + 0.31

If the two diſtances are equal, the terms deſtroy each other, and the correction becomes = 0.

The annexed table is calculated for an 18-inch circle of Mr. Troughton's conſtruction.

He places his diviſions from right to left; the obſervations, therefore, begins with the left-hand object.

Fathoms.	
1000	2″.00
2000	1.00
3000	0.67
4000	0.50
5000	0.40
6000	0.33
7000	0.30
8000	0.25
9000	0.22
10,000	0.20
11,000	0.18
12,000	0.16
13,000	0.14
14,000	0.13
15,000	0.13
16,000	0.12
17,000	0.12
18,000	0.11
19,000	0.10
20,000	0.10
21,000	.10
22,000	.09
23,000	.09
24,000	.08
25,000	0.08

It is a curious circumſtance, firſt noticed by Legendre, that this correction for eccentricity, when applied to the three angles in a triangle, becomes zero.

For, if *a*, *b*, *e*, repreſent the ſides of a triangle, we have the correction for the angle.

$$A = \frac{\frac{1}{2}e}{C} - \frac{\frac{1}{2}e}{b}$$

$$B = \frac{\frac{1}{2}e}{a} - \frac{\frac{1}{2}e}{c}$$

$$C = \frac{\frac{1}{2}e}{b} - \frac{\frac{1}{2}e}{a},$$

which together = 0.

Reduction of the obſerved Angle to the Horizon.

The repeating circle does not give directly the horizontal angle between two ſignals, but the oblique angle; it is neceſſary, therefore, to take the zenith diſtances of the obſerved objects, and then calculate the azimuthal angle by the reſolution of a ſpherical triangle.

The reduction is as follows:

Let A = angle of poſition, or obſerved angle.
H = altitude of ſignal A.
h = altitude of ſignal B.

Let

Let $n = \text{ſin.}^2 \tfrac{1}{2}(\text{H} + h)\ \text{tang.}\ \tfrac{1}{2}\text{A} - \text{ſin.}^2 \tfrac{1}{2}(\text{H} - h)$ cot. $\tfrac{1}{2}$A.

Then the cor. $x = n$, ſec. H, ſec. h.

If the zen. diſtances differ more than 2° or 3° from 90°, this formula may be employed.

$$\text{Sin.}\ \tfrac{1}{2} z = \sqrt{\frac{\text{ſin.}\left(\frac{\text{C} + \delta + \delta'}{2} - \delta\right)\ \text{ſin.}\left(\frac{\text{C} + \delta + \delta'}{2} - \delta'\right)}{\text{ſin.}\ \delta - \text{ſin.}\ \delta'}}$$

z being the angle reduced to the horizon, C the angle at the centre, δ and δ' the zen. diſtances of the ſignals.

To facilitate this reduction, we have added the tables calculated for this purpoſe by M. Delambre. By theſe tables we may at the ſame time reduce the horizontal angle to that formed by the chords.

The uſe of theſe tables will be eaſily underſtood by an example.

H + h is the ſum of the zenith diſtances of the obſerved objects diminiſhed by 180°.

If the ſum ſhould be leſs than 180°, H + h is the remainder required to complete 180°.

H — h is always the difference between the two zenith diſtance.

(H + h) and (H — h) are always conſidered as poſitive numbers.

P + Q is the ſum of the diſtances in French toiſes between the obſerver and each of the ſignals.

P — Q is the difference between theſe diſtances; (P — Q) is always poſitive.

With (P + Q) and (P — Q) take in Tab. II., two numbers, to which you always muſt annex the ſign.

With the obſerved angle, take in Tab. IV. the number, *Tangent*, to which the ſign + muſt be always annexed, and which muſt be placed under the factor found by H + h.

With the ſame angle take in the adjoining column, *Cotangent*, to which annex ſign —, and place it under the factor found by H — h. Place theſe ſame numbers under the factors (P + Q) and (P — Q), as in the example. Make the four requiſite muliplications.

The difference of the two firſt products is the reduction to the horizon, to be applied according to its ſign.

The difference of the two laſt products is the reduction to the chords, to be applied with its proper ſign to the horizontal angle.

This laſt reduction is almoſt always ſubtractive, but it ſometimes becomes additive, by the fourth product exceeding the third.

In general, the fourth product is nothing, and the third always very ſmall; ſo that in calculating the reduction, which is indiſpenſable, it is very little more trouble to reduce the angle to the chords. Theſe tables are, in general, quite ſufficient for the reduction to the horizon; but, for greater exactneſs, Table III. is added. The difference of the products, as obtained above, may, by means of this table, be multiplied by ſec. H, ſec. h, as required by the formula. If greater preciſion be required, the whole calculation may be repeated with the corrected angle, inſtead of the obſerved angle.

Table V. is for calculating the ſpherical exceſs.

To make uſe of this table, it is neceſſary to have a plan of the triangles with a ſcale. The arguments are one ſide of the triangle as a baſe, and the height.

Example.

Obſerved Angle.	Zenith Diſtance.	Diſtance of Signals in Toiſes.
32° 20′ 15″.7	A = 89° 41′ 54″.6	A = 18283
	B = 88 49 15.6	B = 24423
	178 31 10.2	

H + h = 1 28 49.8
H − h = 52 39

	Tab. I. H + h	Tab. I. H − h	Tab. II. P + Q	Tab. II. P − Q
Argument	H + h	H − h	P + Q	P − Q
Factors	+ 1.669	+ 0.587	− 0.112	− 0.003
Tab. IV.	+ 5.99	− 7.106	+ 5.99	− 7.106
	15021	3522	− 0.67	+ 0.2
	15021	0587	+ 0.02	
	8345	4109		
	+ 9.99731	− 41.71222	− 0.65 = reduction to the chords.	

Obſerved angle	- -	32° 20′ 15″.7
Reduction to horizon	-	31.7
Horizontal angle	−	= 32 19 44.0
Reduction to the chords	-	− 0.65
Angle of the chords	-	32 19 43.45

When the depreſſions are ſmall, we may, inſtead of the tables, uſe this formula.

$$x = \left\{\left(90° - \frac{\delta + \delta'}{2}\right)\ \text{tang.}\ \tfrac{1}{2}\text{C} - \left(\frac{\delta - \delta'}{2}\right)^2 \text{cot.}\ \tfrac{1}{2}\text{C}\right\}$$

ſin. 1″.

Example by the Formula.

δ = 89° 41′ 54″.6
δ' = 88 49 15.6

$\delta + \delta'$ = 178 31 10.2 $\qquad \delta - \delta'$ = 0° 52′ 39″

$90° - \frac{\delta + \delta'}{2}$ = 0 44 24.9 $\qquad \frac{\delta - \delta'}{2}$ = 0 26 19.5

= 2664″.9 = p $\qquad$ = 2579″.5 = q

Sin. 1″	4.68557		4.68557
Log. p^2	6.85136	Log. q^2	6.39704
Tang. $\tfrac{1}{2}$C	9.46228	Cot. $\tfrac{1}{2}$C	0.53764
	+ 0.99921 = 9″.98		− 1.62025 = 41″.71

− 41.71

− 31.73 = Reduction required.
32° 20′ 15.70

Reduced angle = 32 19 43.97 the ſame as above.

Reduction of the obſerved Angle to the Centre of the Station.

It frequently happens in trigonometrical ſurveys, that the obſervation cannot be taken in the centre of the ſtation; in this caſe, a correction becomes neceſſary.

(*Plate* VII. *fig.* 59.) Let C be the centre of the ſtation, O the place of the obſerver.

Then ACB = AIB − CBO
= AOB + OAC − CBO
or C = O + A − B

$$\text{Sin. A} = \text{ſin. OAC} = \frac{\text{OC ſin. AOC}}{\text{AC}} = \frac{r\ \text{ſin.}\ (\text{O} + \text{BOC})}{\text{D}}$$

$$\text{hence C} = \text{O} + \frac{r\ \text{ſin.}\ (\text{O} + y)}{\text{D ſin. 1}''} - \frac{r\ \text{ſin.}\ y}{\text{G ſin. 1}''}$$

This formula is general, and ſuffers no exception.

C is the angle required at the centre; O, the obſerved angle;

angle; y is the angle between the left-hand object and the centre of the station; r is the distance between the centre of the circle and the centre of the station.

D, the distance of the object to the right.

G, the distance of the object to the left.

If $(O + y)$ exceed 180°, the first term is subtractive.

If the angle y exceeds 180°, the second term becomes additive.

When the observation of the ∠ O is terminated, the upper telescope is always directed towards the left-hand object B, and the inferior towards the right-hand object A.—To observe the ∠ y, the observer should continue to keep the lower telescope on the object A, and let the upper one revolve from the right towards the left, till it points to the centre C.

This correction will be reduced to a single term, when the distance of one object becomes infinite with respect to the other; as when one object is the sun, or a star, as is the case in observations for determining the azimuths of stations.

But this correction may become nothing without either of the distances becoming infinite; by which means it is sometimes possible for the observer so to place his instrument as to reduce the correction to zero. This will be the case if it be on the circle which circumscribes the given triangle A B C.

For then $\frac{\text{sin. } y}{(\text{sin. }(O+y))} = \frac{G}{D}$;

and in the triangle A B C

$$\frac{\text{sin. A}}{\text{sin. B}} = \frac{\text{sin. A}}{\text{sin.}(A+C)} = \frac{G}{D}; \text{ and since } C = O$$

$$\frac{\text{sin. } y}{\text{sin. } C + y} = \frac{\text{sin. A}}{\text{sin.}(A+C)}$$

Expanding the denominators

$$\frac{\text{sin. } y}{\text{sin. C cos.} y + \text{cos. C sin.} y} = \frac{\text{sin. A}}{\text{sin. A cos. C} + \text{cos. A sin. C}}$$

$$\text{or } \frac{1}{\text{sin. C cos. } y \text{ cos. C}} = \frac{1}{\text{cos. C} + \text{cos. A sin. C}}$$

and tang. y = tang. A = tang. 180° + A.

From this it appears, that if the observer has his choice of situation, he may place himself in such a manner as to render any reduction unnecessary; and to do this, he must be on the circumscribing circle, or its tangent, at the point C, so that the angle y may be equal to A, or its supplement.

It however generally happens that the circumstances which exclude the observer from the centre of the station, at the same time prevent him from choosing the exact point as determined above; but as the correction depends on the sine of a certain angle, it is advisable to render it as small as possible, by selecting the most favourable position, particularly, if any difficulty should occur in measuring the distance from the centre of the instrument to the centre of the station.

If the divisions are numbered from right to left, then *right* must be substituted for *left*, and *vice versâ* in the preceding reasoning.

It has been shewn, how, by having the oblique angle of two objects, A and B, as seen from a point C, we can obtain the horizontal or azimuthal angle; but it is necessary, for the truth of our conclusion, that the point C remain the same for the zenith distance observations as for the oblique angles. If we examine the construction of the repeating circle, we shall find that its centre C is lower in the vertical than in the horizontal position: this circumstance seems to have been overlooked by the French astronomers; or they have probably included it in the requisite correction employed for the difference of height of the signal above the centre of the circle. To apply this correction, we are to consider what would be the zenith distance of an object if the centre of the instrument were elevated or depressed a given quantity.

The correction is as follows:

Let dH be the difference of altitude of the two positions, D the distance of the observed signal, δ the zenith distance required to be corrected; then the corrected distance will be $\delta + \left(\frac{\delta \text{ H}}{\text{D}}\right) \frac{\text{sin. } \delta}{\text{sin. } 1''}$.

If the instrument is advanced before the signal, the distance corrected $= \delta + \left(\frac{r}{\text{D}}\right) \frac{\text{cos. } \delta}{\text{sin. } 1''}$; r being the distance of the centre.

In Mr. Troughton's circles the centre of the circle is 5.4, or 5.5 inches lower in the vertical than in the horizontal position.

When the Signal is unequally illuminated.

When the signal is unequally illuminated by the sun, the observed point is neither in the axis, nor in the direction of the axis. For example, *fig.* 63. let $a\,b\,c\,d$ be a section of a signal of four sides, if ab or ac only is sufficiently enlightened to be visible, the observer will direct the optic axis of his telescope to A or B instead of the centre M, and the angle observed will require a correction equal to A O M or B O M. Let P = perpendicular M A, A = angle A M O, D equal the distance O M; the correction c will then be $c = \frac{\text{P sin. A}}{\text{D sin. } 1''}$.

This correction is subtractive, if the observed point is to the $\left\{\begin{matrix}\text{right}\\ \text{left}\end{matrix}\right\}$ of the centre in the object to the $\left\{\begin{matrix}\text{right}\\ \text{left}\end{matrix}\right\}$. It is additive, if the observed point is to the $\left\{\begin{matrix}\text{left}\\ \text{right}\end{matrix}\right\}$ of the centre in the object on the $\left\{\begin{matrix}\text{right}\\ \text{left}\end{matrix}\right\}$.

If the signal be a round tower or mast of sensible diameter, the calculation is something longer, because the azimuth of the sun influences the quantity of the correction.

Let an observer in O be situated so far from the round tower (*fig.* 62.) A P S P, as to be unable to see the part not illuminated by the sun; he will direct his view to the middle of the illuminated part, instead of the centre of the whole.

Let N M be the meridian line, M C S the azimuth of the ☉, the semicircle A S B will be illuminated by the sun to the extremity A, of the enlightened part, draw O A, and on the other side the visual ray O E, tangent to the tower; the visible part A P S E will be unequally divided by O C. If x be the azimuth of the observer, z the azimuth of the sun, d = C E, and D = O C, the correction will be $C = \frac{d \text{ sin.}^2 \frac{1}{2}(x - z)}{\text{D sin. } 1''}$.

$x - z$ may be either calculated or observed. By calculation:

Cos. z = sin. L cos. H $- \frac{\text{cos. L tang. B}}{\text{sin. H}}$: L being the lat., B the declination of the sun, and H the hour angle.

To observe $x - z$, take the horizontal angle between the

the fun and tower by the azimuth circle, which will always be exact enough for this correction.

On the Calculation of the Triangles.

When the obferved angles are reduced to the horizon by the method above ftated, the triangles may be either confidered as rectilinear, fpherical, or fpheroidical: the firft cafe fuppofes the angles reduced to their chords, and that the fides of the triangles become the edges of an irregular polyhedron infcribed within the terreftrial fpheroid; the bafe in like manner fhould be reduced to a chord line, by fubducting from its meafured length the excefs of the arc above the chord.

But the fpherical computation is rendered very eafy by a theorem firft inveftigated by Legendre, by which it appears that a fpherical triangle, whofe fides are very fmall, may be calculated without fenfible error by the rules of plane trigonometry, provided a fmall correction be firft made in the obferved angles.

When the Englifh furvey was firft began, this theorem was unknown; and general Roy, who was the firft perfon that had taken the fpherical excefs into his calculations, corrected his triangles in a more arbitrary manner than he would have done, had he been aware of the curious property above-mentioned. By this theorem is derived a more accurate method of correcting the angles for computation. One third of the fpherical excefs, as found by obfervation, fhould be fubtracted from each angle, and the fides calculated as if they were rectilinear. For the demonftration of this theorem, fee Legendre's Treatife on Geometry. Colonel Mudge and Delambre prefer reducing the angles to chord lines; this method, when the three angles are all obferved, is perfectly accurate; but when one angle only is obferved and the reft inferred, as in calculating diftances from the meridian and its perpendicular, the method of Legendre feems to be the moft eafy and leaft liable to error.

General Principles of the Method of tracing and calculating a Meridian Line.

If we imagine a plane paffing through the axis of the earth and the zenith of any place; this plane, extended to the limits of the celeftial fphere, will there trace a great circle, which will be the meridian of that place: and if a line be drawn through all the points of the furface of the globe, which have their zenith in this circle, it will form the correfponding terreftrial meridian. From the immenfe length of the radius of the heavens, the verticals of all thefe points may be confidered as parallel to the plane of the celeftial meridian: fo that the terreftrial meridian may be defined a curve paffing through and connecting thofe points, in which all the verticals parallel to the plane of the celeftial meridian interfect the furface of the earth. This curve will deviate from the above plane, if the earth be an irregular fpheroid, and be a curve of double curvature; but, on the contrary, will lie entirely in it, if it be a fphere, or any regular figure of revolution.

If in any given point, we fix a fignal, and by means of the optic axis of a telefcope, directed exactly north or fouth of that fignal, we place others in this axis, and by removing the telefcope continue, in the fame manner, to place other fignals in the fame direction, we fhould trace a meridian line. But as this method would be inconvenient, if not impoffible in practice, we follow, as has been feen above, another method which leads us to the fame refult.

Let A B C D E, *Plate* VII. *fig.* 60, be a chain of triangles extended in the direction of the meridian, and whofe fides may be confidered as arcs of the terreftrial fpheroid. Suppofe, by an obfervation of the azimuth, the inclination or direction of the fide A C with the firft fide of the meridian A M be known. The point M, where this curve cuts B C, may be found by trigonometry. The points A, B, C, being in the fame horizontal plane, A M will likewife be in the fame plane; but from the curvature of the earth the continuation of this line, M M′, will be above the furface of the next triangle B C D: if then, without changing the angle C M M′, the line M M′ be bent down to the plane of the triangle B C D, by fuppofing it to turn round B C as an axis, the point M′ will defcribe a fmall arc of a circle which may be confidered as a ftraight line perpendicular to the plane B C D.

From this it follows, that the operation confifts in bending down this line in the direction of a vertical, and in calculating the diftance M M′, to find the point M′.

By carrying on the meridian line in this manner through the whole feries of triangles, we may by trigonometrical calculation find the direction and length of this meridian from one extremity to the other.

If the earth be of an irregular figure, this line differs a little from the terreftrial meridian; but it always has this property, that it is the fhorteft line that can be drawn between its two extremities, over the furface of the earth.

Now, if we imagine a great circle perpendicular to the celeftial meridian, paffing through the zenith of the place of the obferver, this circle will reprefent the prime vertical of that place. A curve connecting all the points on the furface of the earth, which have their zenith in this circle, will form the perpendicular to the meridian, which may be traced in the fame manner as the meridian itfelf.

In the fphere thefe perpendiculars are great circles which cut each other on the equator. But on the ellipfoid, and ftill more if that be irregular, thefe perpendiculars will be curves of double curvature.

Whatever be the nature of the terreftrial fpheroid, the parallels to the equator are curves in which all the points have the fame latitude.

The fituation of a place is determined when the perpendicular to the meridian or its parallel is known, and alfo the fituation of the place on this perpendicular or parallel.

When, therefore, a feries of triangles and their direction have been calculated according to the principles already explained, we obtain the pofition of the fummits of all their angles, by means of their co-ordinates, or diftances from the perpendicular, and from the meridian of the principal ftation.

Suppofe the triangles A B C, B C D, to make part of a chain of other triangles whofe fides are arcs of great circles of a fphere, having for its radius the diftance of the centre of the earth to the furface of the fea, and that the angle C A X, which meafures the azimuth Z of the fide A C, or its inclination to the meridian, has been determined by obfervation; we muft firft calculate the fpherical excefs ε in the right angled triangle A c C, and then refolve it by the two following proportions:

$$\text{Sin. } (90^\circ - \tfrac{1}{3}\varepsilon) : \text{cof. } (z - \tfrac{1}{3}\varepsilon) :: A\,C : A\,c = x.$$

$$\text{Sin. } (90^\circ - \tfrac{1}{3}\varepsilon) : \text{fin. } (z - \tfrac{1}{3}\varepsilon) :: A\,C : C\,c = y.$$

The azimuth of A B is known, becaufe $\angle BAX = \angle CAB - CAX$; and by calculating the fpherical excefs of the triangle A B M′, we have $AM'B = 90^\circ - M'AB - ABM' + \varepsilon$.

To determine the fides A M′, B M′, we muft deduct $\frac{1}{3}$ of the fpherical excefs, $\frac{1}{3}\varepsilon$, from each of the angles of the triangle A B M′, to obtain thefe proportions.

$$\text{Sin. } (90^\circ - A - B + \tfrac{2}{3}\varepsilon) : \text{fin. } (B - \tfrac{1}{3}\varepsilon) :: A\,B : A\,M'.$$

$$\text{Sin. } (90^\circ - A - B + \tfrac{2}{3}\varepsilon) : \text{fin. } (A - \tfrac{1}{3}\varepsilon) :: A\,B : B\,M'.$$

In

In each of the right angled triangles, A b B, M′ d D, two angles and the hypothenuſe are known, and thus the ſides A b, b B, M′ d, d D, may be found. Therefore the diſtances of the points, B, D, from the meridian and its perpendicular are known.

Proceeding in this manner in the triangle A C N or M′ D N, to obtain A N and D N, the continuation of C D, and in the triangle D N F to get the ſide N F, and the angles D N F, D F N, we ſhall be able to determine the co-ordinates.

The diſtance f F, and the angles D F N, N F f, being known, we have f F P = 90° − E F D − D F N − N F f; ſince all the horizontal angles about a given ſtation are together equal to four right angles.

Since two angles and a ſide are known in the right angled triangle f F P, we may calculate the ſpherical exceſs and the angle F P f and the other ſides f P, F P. Then by reſolving the right angled triangle e E P, the co-ordinates of E with reſpect to the meridian A X, and its perpendicular A Y, may be found. It is adviſable to make a ſcale of the obſerved chain of triangles, to ſee if any ſuch as A C N; M′ E P, which have been formed to facilitate the calculation, may not be too obtuſe or too acute to be employed with ſafety.

This method may be very properly employed for determining the length of an arc of the meridian, when the triangles do not deviate from the meridian line; and as the azimuths of a great number of ſides are found, theſe may be verified by direct obſervation.

In a memoir of Legendre, of which the following is an extract, he ſhews a method of calculating a meridian line, without drawing perpendiculars from the ſeveral ſtations.

When all the angles of the triangles are reduced to the horizon, and the correction neceſſary to reduce the ſum of the angles to 180 + the ſmall exceſs due to the area applied to the angles, and calculated *à priori*, the inequality of the heights of the ſtations need no longer be regarded, and the whole chain of triangles may be regarded as projected on a ſpherical or ſpheroidical ſurface, which may be conſidered as an extenſion of the ſurface of the ſea.

In this hypotheſis, which ſeems the moſt proper for ſimplifying the calculation, the triangles become ſpherical or ſpheroidical. The ſides are, or ought to be, conſidered as arcs of a circle, and the baſe, which is equally an arc of a circle, may be eaſily deduced from the meaſured baſe, by applying to it a correction calculated from the known height of the two extreme points above the level of the ſea. This being granted, we may employ the theorem given in the memoirs of the academy for the year 1787, to calculate the different ſides of the projected chain of triangles. Conſequently, if in the propoſed triangle the ſum of the angles is 180 + w, we muſt take away $\frac{1}{3}$ w from each angle to reduce the ſum to 180. This ſubtraction being made, we may proceed as if the given triangle was rectilinear. That is to ſay, we may deduce this proportion: the ſine of an angle oppoſite to a given ſide is to that ſide as the ſine of another angle is to its oppoſite ſide. The fourth term will be the length of the ſide of the ſpherical triangle we wiſh to reſolve; and which can thus be found with as much facility, as if the chain of triangles was ſituated entirely in the ſame plane. It has been propoſed to calculate the ſame ſpherical triangles by means of rectilinear triangles formed by reducing the ſides to their chords. But for this method we muſt determine the difference between each angle of the ſpherical triangle, and the correſponding angle of the rectilinear triangle, by a ſeparate operation. It is evident that this method muſt be leſs ſimple, and more ſubject to error than the one we have mentioned.

Let A, B, C, D, E, F, &c. (*Pl.* VII. *fig.* 61.) be a chain of triangles, a little diſtant from the meridian, and traced upon a curved ſurface, repreſenting the level of the ſea. We ſuppoſe the angles and ſides of the triangles known, by the operation already deſcribed. We may know by obſervation the angle, C A M, which meaſures the azimuth of the ſide, A C, or its inclination relative to the meridian. It is required to find the length of the meridian, A X, prolonged till it meets the perpendicular, L X, let fall from the laſt point of the chain. For this purpoſe we ſhall follow the ſame principles, as in the reſolution of the triangles. But we may, according to circumſtances, find means to abbreviate, and to avoid the calculation of as many parts of the meridian as there are triangles.

In the figure propoſed, having prolonged C D to M, the triangle A C M muſt be reſolved, in which the ſide, A C, and the two adjacent angles, C A M, and A C M, are known. The value of the ſpherical exceſs, w, in this triangle, muſt then be calculated to get the repreſentative of C M A. By means of theſe three angles, and the known ſide, A C, we may determine the two ſides, A M, and C M, by the ſame proportion as if the triangle was rectilinear. The value of M O is obtained by reſolving the quadrilateral figure, D M O F, in which the angles M, D, F, and the ſides D M, D F, are known. Let the diagonal, M F, be drawn, the triangle, D M F, muſt then be computed, in which the ſides, D M, D F, and the included angle, D, are known. For this purpoſe we may proceed as if the triangle D M F was rectilinear, recollecting previouſly to ſubtract one third of the ſpherical exceſs due to the area of the triangle from the angle, M D F. By theſe means we ſhall find the ſide, M F, and the two angles, D M F, D F M, to each of which we muſt add $\frac{1}{3}$ w. Proceeding then to the triangle M F O, the ſide, M F, and the two adjacent angles are known; the ſides, M O, F O, and the angle, M O F, may be found in the uſual manner. In the triangle, O P H, having given the ſide, O H, and the two adjacent angles, O P, P H, and the angle O P H, may be determined. The remainder of the meridian, P X, may now be found by the reſolution of the triangles, P H K, P Q K, and Q L X. But it is a more ſimple method to prolong the arc J L, and to determine P X, by the triangles, P J Z, and L X Z: in this laſt the hypothenuſe, L Z, the angle Z, and the right angle, X, are known. Then after having determined the valve of w, proper for this triangle, it may be reſolved by the following proportion:

Sine $(90 - \frac{1}{3} w)$: L Z : : (Coſ. Z $- \frac{1}{3} w$) : X Z.

All the caſes that can occur in this operation are collected in the figure given as an example, and no farther difficulty can exiſt in the application of this method. In general the very ſmall quantity, w, varies from one triangle to another, and ſhould be determined *à priori*, for each of the triangles to be reſolved. One-third of this quantity ſhould be ſubtracted from each angle of the ſpherical triangle, to enable us to employ the rules of rectilinear trigonometry. But the reſult being found, we ſhould add one $\frac{1}{3}$ w to every angle. We have given an example of the reſolution of a quadrilateral figure, D M F O, in which two ſides and three angles are known. As this calculation is a little more difficult than ordinary ones, it might be avoided by prolonging the two ſides E D, E F, and reſolving the triangles, R D M, R E N, and F N O. But here are three triangles to be calculated inſtead of two, ſo that the firſt method ſeems preferable. By this operation the azimuths of many ſides of the chain are found at the ſame time, that is, the angles which theſe ſides make with the meridian. If then theſe azimuths have been pre-

viouſly

viously determined in two different places, as is usually done, at the two extremities of the chain, we shall have a very simple method of verification, since the calculated and observed azimuths ought to agree.

It must finally be observed, that the point X has rather greater latitude than the point L. Let λ be the latitude of the point L, r the radius of curvature of the meridian towards L, y the distance L X, R the number of seconds, comprised in the radius of the tables, we shall find that the latitude of the point X is $\lambda + \frac{1}{2} R \left(\frac{y}{r}\right)^2$ tang. λ, where the correction will be expressed in seconds.

Though the different portions of a meridian line may be calculated by either of these methods, yet the problem in its more extended signification usually embraces many other considerations. Having given the latitude of an extreme point of a terrestrial arc, and the inclination of one side of the triangles to the meridian, it is required to determine by calculation the latitudes of all the stations, their azimuths with regard to each other, and their difference of longitude from the point of departure, the distance between the parallels of any two stations, and lastly the arc of the meridian intercepted by the extreme stations. When the triangles are large, and diverge considerably from the meridian, the computation to be correctly made should be founded on some hypothesis of the figure of the earth; that is to say, the triangles should be considered not as spherical but spheroidical. A very useful theorem is given in the English survey, for the calculation of these triangles; and we shall extract from Puissant's "Traité de Geodesie" an investigation of the formulæ, which form the basis of the practical rules given by Delambre and Legendre.

The principal object of these formulæ is to obtain algebraical expressions for computing the value of the following quantities:

The radius of a circle parallel to the equator in any latitude;—the normal, or radius of curvature of a great circle perpendicular to the meridian;—the radius of the earth, or the line drawn from its centre to any point where latitude is known;—the radius of curvature to any part of the arc of the meridian;—the quarter of the meridian in terms of a measured arc, and of the latitude of its extremities;—the compression, or ellipticity of the terrestrial spheroid, deduced from a measure of two arcs;—the eccentricity;—the length of a standard measure as the French metre, which is assumed equal to the $\frac{1}{10000000}$th part of the meridian.

Investigation of Formulæ for expressing in Terms of the Latitude different Parts of the Meridian, the Earth being supposed an ellipsoid of Revolution.

Let CE be radius of the equator (*fig.* 64.): P the pole.

If from the point A a tangent AT be drawn to the elliptic arc BAE; MA will be the normal to the point A, and $\angle$ALT$=\angle$FAT$=$ latitude of the point A.

The equation to the ellipse is $a^2 y^2 + b^2 x^2 = a^2 b^2$; and for the point A, whose co-ordinates are x', y', we have $a^2 y'^2 + b^2 x'^2 = a^2 b^2$. At the same point A the equation to the normal AL is $y - y' = \frac{a^2\, y'}{b^2\, x'} \cdot (x - x')$; if $y = o$, then CL or $x = \frac{a^2 - b^2}{a^2}\, x'$; from which it is easy to conclude that the normal AL $= n = \frac{b}{a}\left(b^2 + \frac{a^2 - b^2}{b'^2}\, y'^2\right)^{\frac{1}{2}}$.

Let ALF $=$ L, then $y' = n$ sin. L; and consequently $y'^2 = \frac{b^2}{a^2}\left[b^2 + \frac{a^2 - b^2}{b^2} y'^2\right]$ sin.^{2} L; hence $y'^2 = \frac{b^4 \text{ sin.}^2 \text{ L.}}{a^2 - (a^2 - b^2) \text{ sin.}^2 \text{ L}}$. (1).

And $n = \frac{b^2}{a}\left[1 - \frac{a^2 - b^2}{a^2} \text{ sin.}^2 \text{ L}\right]^{-\frac{1}{2}}$. (2).

If in this equation we put $a = 1$ and $\frac{b}{a}$ and b' we shall have $\frac{a^2 - b^2}{a^2} = e^2$; or $1 - b'^2 = e^2$, e expressing the eccentricity: then $n = (1 - e^2)(1 - e^2 \text{ sin.}^2 \text{ L})^{-\frac{1}{2}}$ $\frac{1 - e^2}{(1 - e^2 \text{ sin.}^2 \text{ L})^{\frac{1}{2}}}$. (3).

And the equation (1) will become A F $= y' = \frac{(1 - e^2) \text{ sin. L}}{(1 - e^2 \text{ sin.}^2 \text{ L})^{\frac{1}{2}}}$. (4).

In the same hypothesis the equation of the ellipse is changed into $y'^2 = (1 - e^2)(1 - x'^2)$ and by the preceding equation CF $= x' = \frac{\text{cos. L}}{(1 - e^2 \text{ sin.}^2 \text{ L})^{\frac{1}{2}}}$. (5).

This is the value of the radius of a parallel of latitude to the point A.

In the same manner, the value of CL, found as above, may be changed into CL $= e^2\, x'$; but x' is given in equation (5); therefore CL $= \frac{e^2 \text{ cos. L}}{(1 - e^2 \text{ sin.}^2 \text{ L})^{\frac{1}{2}}}$. (6).

All the values thus obtained, are relative to the greater axis taken as the line of x.

The same mode of calculation will lead us to the values of AM and CM, &c.

Let $a^2 x^2 + b^2 y^2 = a^2 b^2$, and let the values of x be now taken on the lesser axis. Let the normal A M $= n'$, we shall have for the point A; $y^2 = n'^2$ cos.^{2} L; but if in equation (2) a be changed into b and *vice versâ*, and sine for cosine AM $= n' = \frac{a^2}{b}\left(1 - \left(\frac{b^2 - a^2}{b^2}\right) \text{ cos.}^2 \text{ L}\right)^{\frac{1}{2}}$, and since $b = b'$ when $a = 1$,

$$n' = \frac{1}{(1 - e^2)^{\frac{1}{2}}\left[1 + \frac{e^2}{1 - e^2}(1 - \text{sin.}^2 \text{ L})\right]^{\frac{1}{2}}} = \frac{1}{(1 - e^2 \text{ sin.}^2 \text{ L})^{\frac{1}{2}}}. \quad (7).$$

Since $y^2 = n'^2$ cos.^{2} L $y^2 = \frac{\text{cos.}^2 \text{ L}}{1 - e^2 \text{ sin.}^2 \text{ L}}$.

By the equation of the ellipse $y^2 = \frac{(1 - e^2) - x^2}{1 - e^2}$ from whence we may deduce

$x^2 = \frac{(1 - e^2)^2 \text{ sin.}^2 \text{ L}}{1 - e^2 \text{ sin.}^2 \text{ L}}$.

As we have found above CL $= \frac{a^2 - b^2}{a^2}\, x'$; we shall in the present case have CM $= \frac{b^2 - a^2}{b^2}\, x = \frac{-e^2}{1 - e}\, x$; substituting for x its value in the preceding equation, we obtain CM $= \frac{-e^2 \text{ sin. L}}{(1 - e \text{ sin.}^2 \text{ L})^{\frac{1}{2}}} = -e^2\, n'$ sin. L. (8).

As to the value of A C, it is evidently represented by $\sqrt{x^2 + y^2}$, so that whether we take the above values of x^2,

x^2, y^2, or have recourſe to the equations (4) and (5), we have equally $AC = r = \left[\frac{e^2(1-e^2)\,\text{ſin.}^2 L}{1-e^2\,\text{ſin.}^2 L}\right]$. (9).

This formula is ſuſceptible of a more commodious form: Imagine a ſphere circumſcribing the ellipſoid, which has for its radius that of the equator, the angle $C a E = F a T = \lambda$ will be the latitude of the point a on the ſphere; but the points A, a, have the ſame abſciſſe C F; therefore if we take $AF = y'$ and $aF = y''$, the equations of the circle and ellipſe will be reſpectively $\left\{\begin{array}{l} y'^2 = 1 - x^2 \\ y'^2 = b'^2(1-x^2)\end{array}\right\}$ eliminating x^2; $y'^2 = b'^2 y''^2$.

But aF is the ſine of λ, ſince $aC = 1$, therefore ſine $^2\lambda = \frac{(1-e^2)\,\text{ſin.}^2 L}{1-e^2\,\text{ſin.}^2 L}$ and the equation (9) becomes $AC = (1 - e^2\,\text{ſin.}^2\lambda)^{\frac12}$. (10).

Now to find the value of λ, divide in the preceding equations of the two curves one by the other, and $\frac{y'}{y''} = b'$.

By inſpection of the figure it will be ſeen that $\frac{y'}{FT} = \frac{1}{\text{tang. } L}$ and $\frac{y''}{FT} = \frac{1}{\text{tang. }\lambda}$ therefore $\frac{y'}{y''} = \frac{\text{tang. }\lambda}{\text{tang. } L}$.

From theſe two values of $\frac{y'}{y''}$ it reſults that tang. $\lambda = b'$ tang. L.

If B be taken ſuch that coſ. B $= b'$, then $1 - b' = 1 -$ ſin. $^2\frac12$B, coſ. B. $= 2$ ſin.$^2\frac12$B, tang. $\lambda =$ coſ. B tang. L, and 2 coſ.$^2\frac12$B $= 2 - 2$ ſin.$^2\frac12$B $= 1 + b'$, therefore tang.$^2\frac12$B $= \frac{1-b}{1+b'}$, and by the expanſion of a trigonometrical formula, $L - \lambda =$ tang.$^2\frac12$ B ſin. 2 L $- \frac12$ tang.$^4\frac12$ B ſin. 4 L $+ \frac13$ tang.$^6\frac12$ B ſin. 6 L, &c.

$$L - \lambda = \left(\frac{1-b'}{1+b'}\right)\text{ſin. } 2L - \frac12\left(\frac{1-b'}{1+b'}\right)^2 \text{ſin. } 4L + \frac13\left(\frac{1-b'}{1+b'}\right)^3\text{ſin. } 6L.$$

This ſeries is rendered very converging by introducing the ratio of the axis of the ellipſe $m : n$, for $b' = \frac{n}{m}$ and $\frac{1-b'}{1+b'} = \frac{m-n}{m+n} = \frac{1}{m+n}$ for m, n generally differ but one unit from each other: thus $L - \lambda = \left(\frac{1}{m+n}\right)$ ſin. 2 L $- \frac12\left(\frac{1}{m+n}\right)^2$ ſin. 4 L $+ \frac13\left(\frac{1}{m+n}\right)^3$ ſin. b L, ſince $m = 334$, $n = 333$ nearly. The firſt term of this ſeries is ſufficient.

Thus, to find A C; in the expreſſion of its value $(1 - e^2\,\text{ſin.}^2\lambda)^{\frac12}$, ſubſtitute for λ its equal as found above.

To find an expreſſion for the radius of curvature of the meridian, it ſhould be remembered that in curves of the ſecond order it is always equal to the cube of the normal divided by one quarter the ſquare of the parameter.

Therefore for the lat. L

$$R = \frac{n^3}{\frac14 p^2} = \frac{(1-e)^3\,(1-e^2\,\text{ſin.}^2 L)^{-\frac32}}{\frac14 p^2};$$

but $\frac14 p^2 = \frac{b^4}{a^2} = (1-e^2)^2$, hence $R = (1-e^2)^2\,(1-e^2\,\text{ſin.}^2 L)^{-\frac23}$. (11).

If this value be required in terms of the ellipticity of the earth, the longer or equatorial axis being taken as unity, let $\frac{a-b}{a} = \alpha$, and becauſe $1 - b'^2 = e^2$ and $b' = 1 - \alpha$

$$e^2 = 1 - (1-\alpha)^2 = 2\alpha - \alpha^2,$$

hence $R = (1 - 2\alpha + \alpha^2)\,(1 - (2\alpha - \alpha^2)\,\text{ſin.}^2 L)^{-\frac32}$.

Expanding this negative power, and rejecting the ſecond powers and thoſe above, we have

$$R = 1 - \alpha(2 - 3\,\text{ſin.}^2 L). \quad (12).$$

We may proceed now to the rectification of the curve or arc of the meridian.

Let S = arc between the equator and the point whoſe latitude is L its differential.

$dS = \sqrt{dx'^2 + dy'^2} = dx'\sqrt{\frac{1-e^2x'^2}{1-x'^2}}$; (vid. Lacroix cal. diff.) Since $x' = \frac{\text{coſ. } L}{\sqrt{1-e^2 \times \text{ſin.}^2 L}}$ (equal 5.)

$$dx' = \left\{\frac{d\,\text{coſ. } L}{\sqrt{1-e^2\,\text{ſin.}^2 L}} - \frac12\,\frac{\text{coſ. } L\; d(1-e^2\,\text{ſin.}^2 L)}{(1-e^2\,\text{ſin.}^2 L)^{\frac32}}\right.$$

But when x' increaſes, L diminiſhes; therefore

$$dx' = -dL\,\text{ſin. } L\left(\frac{-1}{(1-e^2\,\text{ſin.}^2 L)^{\frac12}} + \frac{e^2\,\text{coſ.}^2 L}{(1-e^2\,\text{ſin.}^2 L)^{\frac32}}\right) = \frac{(1-e^2)\,\text{ſin. } L\; dL}{(1-e^2\,\text{ſin.}^2 L)^{\frac32}}$$

In the expreſſion for dS, for x' and dx', ſubſtitute their values as above; and

$dS = (1-e^2)\,(1-e^2\,\text{ſin.}^2 L)^{-\frac32} dL$ —, and by the binomial theorem.

$\frac{dS}{1-e^2} = \left\{1 + \frac32 e^2\,\text{ſin.}^2 L + \frac32\cdot\frac54 e^4\,\text{ſin.}^4 L + \frac32\cdot\frac54\cdot\frac76 e^6\,\text{ſin.}^6 L + \right\} dL$; then, by changing the powers of the ſines and coſines of the multiple arcs (vid. La Croix's Diff. Cal. N° 199.)

$$\frac{dS}{(1-e^2)} = \left\{1 + \frac32\cdot\frac{2}{1.2^2}e^2 + \frac{3\cdot5}{2\cdot4}\cdot\frac{4\cdot3}{1.2.2^2}e^4 + \frac{3\cdot5\cdot7}{2.4.6}\cdot\frac{6\cdot5\cdot4}{1.2.3.2^6}e^6 + \right\}dL$$

$$-\left\{\frac32\cdot\frac12 e^2 + \frac{3\cdot5}{2\cdot4}\cdot\frac{4}{2^3}e^4 + \frac{3\cdot5\cdot7}{2\cdot4\cdot6}\cdot\frac{6\cdot5}{1.2.2^5}e^6\right\}dL\,\text{coſ. } 2L$$

$$+\left\{\frac{3\cdot5}{2\cdot4}\cdot\frac{1}{2^3}e^4 + \frac{3\cdot5\cdot7}{2.4.6}\cdot\frac{6}{1.2^5}e^6\right\}dL\,\text{coſ. } 4L$$

$$-\left\{\frac{3\cdot5\cdot7}{2.4.6}\cdot\frac{1}{2^5}e^6 + \right\}dL\,\text{coſ. } 6L:$$

Or, for conciſeneſs,

$\frac{dS}{(1-e^2)} = m\,dL - n\,dL\,\text{coſ. } 2L + p\,dL\,\text{coſ. } 4L - q\,dL\,\text{coſ. } 6L$; and by integration,

$\frac{S}{1-e^2} = mL - \frac12 n\,\text{ſin. } 2L + \frac14 p\,\text{ſin. } 4L - \frac18 q\,\text{ſin. } 6L +$ (13).

Here the integral is complete, ſince the arc S vaniſhing at the ſame time as L, the conſtant quantity neceſſarily becomes nothing.

It is evident that for another arc S, terminating in the latitude L'

$$\frac{S'}{1-e^2} = m\,L' - \tfrac{1}{2}\,n\,\text{fin.}\,2\,L' + \tfrac{1}{4}\,p\,\text{fin.}\,4\,L' - \tfrac{1}{8}\,q\,\text{fin.}\,6$$

L + &c.; confequently the arc $S - S'$ comprifed between the latitudes L and L′ will be given by the equation.

$$\frac{S-S}{1-e^2} = m\,(L - L') - \tfrac{1}{2}\,n\,(\text{fin.}\,2\,L - \text{fin.}\,2\,L') + \tfrac{1}{4}\,p\,(\text{fin.}\,4\,L - 4\,L') - \tfrac{1}{8}\,q\,(\text{fin.}\,6\,L - 6\,L') +$$
$$= m\,(L - L) - n\,\text{fin.}\,(L - E)\,\text{cof.}\,(L + L) + \tfrac{1}{2}\,p\,\text{fin.}\,2\,(L - L')\,\text{cof.}\,2\,(L + L') - \tfrac{1}{4}\,q\,\text{fin.}\,3\,(L - L')\,\text{cof.}\,3\,(L + L'.) \quad (14).$$

If Q reprefent a quarter of the meridian, L will be equal 90°; and equation (13) gives

$$\frac{Q}{1-e^2} = m\,90°.$$

Dividing this by the preceding

$$\frac{Q}{S-S'} = \frac{90°}{(L-L') - \frac{m}{n}\,\text{fin.}\,(L-L')\,\text{cof.}\,(L+L') + \frac{1}{2}\frac{p}{m}\,x\,\text{fin.}\,2\,(L-L')\,\text{cof.}\,(L+L') - \frac{1}{4}\frac{q}{m}\,\text{fin.}\,3\,(L-L')\,\text{cof.}\,3\,(L+L'.)}$$

But, (rejecting the terms above e^4,)

$$m = 1 + \frac{3}{4}\,e^2 + \frac{45}{64}\,e^4$$
$$\frac{n}{2} = \frac{3}{8}\,e^2 + \frac{15}{32}\,e^4$$
$$\frac{1}{4}\,p = \frac{15}{256}\,e^4$$
$$\frac{n}{m} = \frac{3}{4}\,e^2 + \frac{3}{8}\,e^4$$
$$\frac{1}{2}\frac{p}{m} = \frac{15}{128}\,e^4$$

$$Q = \frac{(S-S')\,90°}{L-L'}\left(1 + \frac{3}{4}\,e^2 + \frac{3}{8}\,e^4\right)\frac{\text{fin.}\,(L-L')\,\text{cof.}\,(L+L')}{L-L'} - \frac{15}{128}\,e^4\,\frac{\text{fin.}\,2\,(L-L')\,\text{cof.}\,2\,(L-L')}{L-L'} \quad (15).$$

To employ this formula, which gives Q in the fame meafure as the arc $S - S'$ (and in which the two terms of the fraction $\frac{90°}{L-L'}$ ought to be of the fame kind) $L - L$ fhould be reduced into parts of the radius, and $\frac{1}{2}\,\pi$ (or 1.5707963267) fubftituted for 90°.

When $L + L' = 90°$; cof. $(L + L')^4 = O$, and then without fenfible error $Q = \frac{(S-S')\,90°}{L-L'}$; that is to fay, that the value of the quarter of the meridian is independent of the ellipticity, and that the degree at 45° is very nearly the 90th part of the quadrant.

In the fame circumftance the equation (14) gives $S - S' = (1 - e^2)\,m\,L - L'$.

And $Q = m\,(1 - e^2)\,\frac{1}{2}\,\pi$

Exterminating m; the radius of the equator being reprefented by unity

$$Q = \tfrac{1}{4}\,\pi\left(1 - \frac{1}{4}\,e^2 - \frac{3}{64}\,e^4 - \frac{5}{256}\,e^6\right) \quad (16).$$

The fame as may be obtained by formulæ (13), by making $L = 90°$.

To ufe the above formulæ, it is neceffary previoufly to determine the elements they contain; thefe are, the eccentricity, e, or the compreffion, α: and as thefe formulæ are relative to an ellipfe whofe greater axis is 1, they muft be multiplied by the equatorial radius expreffed in fome ftandard meafure, as feet or metres, &c. whenever we apply them to the terreftrial meridian.

And firft to find the compreffion α.

Let g, g' be the meafured value of two degrees, let L, L′ exprefs the angles which the refpective normals paffing through the centres of thefe degrees make with the greater axis — π the circumference of a circle whofe radius = 1. R, R′, the radii of curvature we have by formula (12).

$$R = a\,(1 - \alpha\,(2 - 3\,\text{fin.}^2\,L')$$
$$R' = a\,(1 - \alpha\,(2 - 3\,\text{fin.}^2\,L')$$

The femi-circumference of which R is the radius $= \pi\,R$, and it intercepts 180°, confequently,

$$g = \frac{\pi\,R}{180}\;g' = \frac{\pi\,R'}{180}\ \text{fo that}$$
$$\frac{g'}{g} = \frac{1 - \alpha\,(2 - 3\,\text{fin.}^2\,L)}{1 - \alpha\,(2 - 3\,\text{fin.}^2\,L')}$$

Reducing this fraction, and neglecting the terms α^2, &c.

$$\frac{g'}{g} = 1 - 3\,\alpha\,(\text{fin.}^2\,L - \text{fin.}^2\,L')$$

From whence the value of α is found.

$$\alpha = \frac{g - g'}{3\,g\,(\text{fin.}^2\,L - \text{fin.}^2\,L'.)}$$

The equation $\alpha = \frac{g' - g}{3\,g\,\text{fin.}^2\,L''}$, gives $g'' = g\,(1 + 3\,\alpha\,\text{fin.}^2\,)L''$, if we take $L'' = 45°$; $\text{fin.}^2\,L'' = \frac{1}{2}$; then $g'' = g\left(1 + 3\,\frac{\alpha}{2}\right)$; and this degree multiplied by 90 will give the value of a quarter of the meridian. From thefe equations it appears that the increafe of the degree from the equator to the poles is very nearly proportional to the fquares of the fine of the latitude.

If the degree meafured in Peru be employed with that meafured in France by Mechain and Delambre in the above formulæ, the compreffion α will be $\frac{1}{334}$ and $b' = 1 - \frac{333}{334}$ and $1 - b'^2 = e^2$.

Therefore $e^2 = 1 - \left(\frac{333}{334}\right)^2 = 0.005979058$, which quantity has for its log. 7.7766329.

	Toifes. Decim.	Toifes. Sexag.
The equatorial degree is here fuppofed = - - -	51077.7 =	56753
And the degree at 45° - -	51307.4 =	57008

For the equation $\alpha = \frac{g'' - g}{3\,g\,\text{fin.}^2\,L''}$ gives $g'' = g\,(1 + 3\,\alpha\,\text{fin.}^2\,L'')$ and when $L'' = 45°$ $\text{fin.}^2\,L'' = \frac{1}{2}\ \therefore g'' = 51307.4$ decimal = 57008 toifes fexagefimal.

From equat. (14), if Q = 10000000 metres; $a = \frac{10000000}{\frac{1}{2}\,\pi}\left(1 + \frac{1}{4}\,e^2 + \frac{7}{64}\,e^4 + \frac{15}{256}\,e^6\right)$, and fince $e^2 = 2\,\alpha - \alpha^2$, it follows that a expreffed in metres

$$a = \frac{10000000}{\frac{1}{2}\,\pi}\left(1 + \frac{1}{2}\,\alpha + \frac{3}{16}\,\alpha^2 + \frac{1}{32}\,\alpha^3\right)\ \text{from}$$

which log. $a = 6.8045305$, &c. &c.

If with the value of the degree at the equator we deduce its radius of curvature R, we may, by fubftituting its value in equation (12), find the equatorial femidiameter, a, as likewife b. With the above data thefe appear to be

a = 3227122 6	toifes	Log.	6.5147105
= 6375737	metres	Log.	6.8045304
= 20918230	Englifh feet	Log.	7.3205255
b = 3261432	toifes	Log.	6.5134083
= 6356649	metres	Log.	6.8032283
= 20855922	Englifh feet	Log.	7.3192234

If

If in the expreſſion $\alpha = \frac{g' - g}{3\,g\ \text{ſin.}^2 L}$ we take $g' = 60820$ fathoms for the lat. 52° 2′ 20″, as found by the meaſurement of the arc between Clifton and Dunnoſe, the ellipticity, α, will be found $= \frac{1}{336.5}$

For $60820 - 60484.8 = 335.2 = g' - g$

$$\text{Log.}\ \frac{335.2}{3 \times 60484.8\ \text{ſin.}^2\ 52.\ 2.\ 20} = 7.4730119 = \frac{1}{336.5}.$$

Method of M. Legendre for calculating the Latitude, Longitude, and Azimuths of the Stations on a Meridian Line.

Let P (*fig.* 65.) be the pole of the earth, P A, P B two elliptic meridians, let L be the known latitude of the point A, it is required to find that of the point B, ſituated on the arc B A, perpendicular to P A, its longitude, and the azimuth of A as ſeen from B.

Suppoſe A M, B N to be verticals to the points A and B; make $AB = y$, $MA = r$, $NB = r'$.

The ſmall arc y, having r for its radius of curvature, it follows that a ſimilar arc ϕ, whoſe radius $= 1$, will have for its value $\frac{y}{r}$.

If from the point M as a centre, and with the radius $Mb = 1$, the arcs ab, ap, pb, be deſcribed, a ſpherical triangle will be formed, in which the ſide $pa = 90° - L$ will be known, as alſo the ſide $ab = \phi$, and the contained right angle pab; then by trigonometry,

$$\text{coſ.}\ (pb) = \text{ſin. L coſ.}\ \phi,$$

$$\text{tang. P} = \frac{\text{tang.}\ \phi}{\text{coſ. L}}$$

$$\text{tang.}\ b = \frac{\text{coſ. L}}{\text{ſin.}\ \phi}$$

$$pb = 90° - L + \tfrac{1}{2}\phi^2\ \text{tang. L}$$

$$P = \frac{\phi}{\text{coſ. L}} - \tfrac{1}{3}\phi^3 \frac{\text{ſin.}^2 L}{\text{coſ.}^3 L},$$

$$b = 90° - \phi\ \text{tang. L} + \tfrac{1}{3}\phi^3\ \text{tang. L}\ (\tfrac{1}{2} + \text{tang.}^2 L).$$

From the value pb may be deduced the approximate value of the latitude B.

$$90° - pb = L - \tfrac{1}{2}\phi^2\ \text{tang. L}.$$

The angle P is the difference of longitude between A and B, and the angle b the required azimuth P B A.

To have more exactly the latitude of the point B, it may be remarked that it is equal to the complement of the angle P N B, or of the angle $PMB + NBM = pb + NBM$. But as the angle N A M is very nearly equal to the angle N B M, we ſhall have $NBM = \frac{MN\ \text{coſ. L}}{r} = \psi$.

M N may be obtained by the formula (8), for if we take $n' = r$, then $CM = e^2 r\ \text{ſin. L}$, in the ſame manner for the point B, whoſe latitude is $L' - CN = e^2 r\ \text{ſin. L}'$; thus very nearly we have

$$MN = e^2 r\ (\text{ſin. L} - \text{ſin. L}').$$

It is eaſy to ſee that this value is always poſitive, that is to ſay, $CM > CN$, for the latitude of A being evidently greater than that of B, the ſine of L is greater than L′. To decompoſe into factors the quantity ſin. L − ſin. L′, we may take the trigonometrical formula,

$$\text{Sin. L} - \text{ſin. L}' = 2\ \text{ſin.} \left(\frac{L - L'}{2}\right)\ \text{coſ.} \left(\frac{L + L'}{2}\right);\ \text{hence}$$

$$MN = 2\,e^2 r\ \text{ſin.} \left(\frac{L - L'}{2}\right)\ \text{coſ.} \left(\frac{L + L'}{2}\right).$$

Upon the ſuppoſition that L − L′ is very ſmall, the arc may be taken for its ſine, and coſ. L for coſ. $\left(\frac{L - L'}{2}\right)$; then $MN = e^2 r\ (L - L')\ \text{coſ. L}$.

But the approximate latitude of B or $L' = L - \frac{1}{2}\phi^2$ tang. L; hence $MN = \frac{1}{2}e^2 r \phi^2$ tang. L coſ. $L = \frac{1}{2}e^2 r \phi^2$ ſin. L.

It may be deſirable to have a more exact expreſſion for M N and ψ, which may be obtained thus: ſince $r = \frac{1}{(1 - e^2\ \text{ſin.}^2 L)}$; r may be taken without ſenſible error $= 1$; then calling $L - L' = dL$, $L + L' = 2L - dL$, and the equation $MN = 2\,e^2 r\ \text{ſin.}\ \frac{L - L'}{2}\ \text{coſ.}\ \frac{L + L'}{2}$ will become $MN = 2e^2\ \text{ſin.}\ \frac{1}{2}\,dL\ \text{coſ.}\ (L - \frac{1}{2}dL)$.

Expanding the factor coſ. $-dL$ being ſuppoſed very ſmall, $MN = 2e^2\ \text{ſin.}\ dL\ \text{coſ. L} + \frac{1}{2}e^2\ \text{ſin.}^2\ dL\ \text{ſin. L}$.

But when the arc A is very ſmall, ſin. $A = 2$ ſin. $\left(\frac{A}{2}\right)$, and $MN = e^2\ \text{ſin.}\ dL\ \text{coſ. L} + \frac{1}{2}e^2\ \text{ſin.}\ dL,\ \text{coſ. L}$.

Since $\text{ſin. NBM} = \text{ſin}\ \psi = \frac{MN\ \text{ſin. BNM}}{MB} = \frac{MN\ \text{coſ. L}'}{r}$, we ſhall have from the preceding values of M N and r', $\text{ſin.}\ \psi = e^2\ \text{ſin.}\ dL\ \text{coſ. L coſ. L}' + \frac{1}{2}e^2\ \text{ſin.}^2\ dL\ \text{ſin. L coſ. L}'$.

But $\text{coſ. L}' = \text{coſ. L} + \text{ſin. L ſin.}\ dL$;

Hence $\psi = e^2\,dL\ \text{coſ.}^2 L + \frac{3}{2}e^2\,dL\ \text{ſin.}\ dL\ \text{ſin. L coſ. L}$.

Hence it follows that the angle $NBM = \frac{1}{2}\phi^2 e^2$ ſin. L coſ. L, and conſequently the true latitude of $B = 90° - (pb) - \psi$, or $L' = L - \frac{1}{2}\phi^2\ \text{tang. L} - \frac{1}{2}e^2 \phi^2\ \text{ſin. L coſ. L}$.

If L be the latitude of the point A, L′ the latitude of B, y the perpendicular diſtance of B from the meridian of A, and r the radius of the earth, or normal of the point A; taking R″ to expreſs the number of ſeconds in this radius, we ſhall obtain the following equations:

$$L' = L - \tfrac{1}{2}R''\left(\frac{y^2}{r^2}\right)\text{tang. L} - \tfrac{1}{2}R'' e^2 \left(\frac{y^2}{r^2}\right)\ \text{ſin. L coſ. L}\ (a).$$

reciprocally $L = L' + \frac{1}{2}R\left(\frac{y^2}{r^2}\right)$ tang. $L - \frac{1}{2}R'' e^2\left(\frac{y^2}{r^2}\right)$ ſin. L′ coſ. L′. (b).

It is evident that e repreſenting the eccentricity, the ſecond term, in moſt caſes may be rejected. The difference of longitude of A and $B = P = \frac{R'' y}{r\ \text{coſ. L}}\left(1 - \frac{1}{3}\frac{y^2}{r^2}\ \text{tang.}^2 L\right)$. (c).

And the azimuth of the arc B A or angle $PBA = z' = 90° - \frac{R'' y}{r}\ \text{tang. L} + \frac{1}{3}R''\frac{y^3}{r^3}\text{tang L}\ (\frac{1}{2} + \text{tang.}^2 L)$. (d).

If L′ be only known, the laſt equation may, by a trigonometrical formula, be changed into $z' = 90° - R''\frac{y}{r}$ tang. $L' - \frac{1}{3}R\frac{y^3}{r'^3}$ tang. $L'\ (1 + \frac{1}{2}\ \text{tang.}^2 L')$. (e).

Theſe formulæ are not difficult in their application, and do not require a great many logarithms, as they have many elements in common, as will be ſeen in the examples.

It

It will sometimes happen that the latitude of A is not directly given, but the distance x, of the perpendicular from the principal station is known, and may be converted into degrees, by taking the radius of curvature of its middle point, recurring to the general expression $\phi = \frac{x R''}{\text{rad. of curv.}}$.

This method, which supposes the latitude of A known by approximation, is exact enough for every possible practical purpose.

The following expression is still more accurate; let $l =$ latitude of the known station.

$L =$ latitude required of a point on the same meridian, then

$$L = l + \left(\frac{d\,l}{d\,x}\right)x + \tfrac{1}{2}\left(\frac{d^2\,l}{d\,x^2}\right)x^2 +,$$

which will hereafter be shewn to be equal to $\frac{R''x}{r} - \frac{3}{4}R''\left(\frac{e^2}{1-e^2}\right)$ sin. $2L\,\frac{x^2}{r\,r}$:

r' being = normal.

r = radius of curvature to the latitude l.

And if the value of $\phi = \frac{y R''}{r}$ be known at any central point as a principal station, its value at any distance x from that station is equal $\phi = R''\frac{y}{r}\left(1 - \frac{1}{2}\frac{r'^2}{\varrho^2}\,e^2 \text{ sin. } 2l\frac{x}{r}\right)$.

Example I.

Let B (*Pl.* VII. *fig.* 66.) be the tower of Dunkirk, A A′ the meridian of Greenwich; let the latitude of A be supposed 51° 3′ 37″. Let A A′ = x = 152550 Log. = 5.1834122
A′ B = y = 547058 Log. = 5.7380334
required the latitude of B?

First, find the log. of normal = $n = \rho\,(1 + \frac{1}{2}e^2 \text{ sin.}^2 L.)$

Log. sin.² L	9.7817370	
Log. 0.5	9.6989700	
Log. e^2	7.7766329	
		1.0000000
	7.2573399 =	0.0018085
Log. $(1 + \frac{1}{2}e^2 \text{ sin.}^2 L)$	0.0007844 =	1.0018085
Log. ρ	7.3205367	
Log. n or normal	7.3213211	Log n^2 = 4.6426422
		Co. log. n^2 = 5.3573577

Log. 0.5	9.6989700
y^2	1.4760668
R″	5.3144251
Co. log. n^2	5.3573577
Tang. L	0.0925566
Log. of first corrⁿ.	1.9393762 = 86″.97
Log. $\frac{1}{2}\frac{R''y^2}{n^2}$	1.84683
Sin. L cos. L	9.68918
ρ^2	7.77663
Log. of 2d corrⁿ.	9.31264 = 0.205
Diff. of latitude required	87.175

which taken from the latitude of A — 51° 3′ 37″
leaves for the latitude of Dunkirk = 51 2 9.83

Example II.

Let the latitude of A (Greenwich) = 51° 28′ 40″.
A A′ = x = 124322 - Log. = 5.0945480
A′ B = y = 303775 - Log. = 5.4825500
Required the latitude of B, Dover-castle?

First, find A′ B′, or difference of latitude between A′ and B.

Log. 0.5	9.69897
R″	5.31442
y^2	0.96510
Co. log. n^2	5.35735
Tang. L	0.09376
	1.42960 = 26″.89 = 1st corr.
$\frac{1}{2}\frac{R''y^2}{n^2}$	1.33584
ρ^2	7.77663
Sin. L cos. L	9.68918
	8.80165 = 0.06 = 2d corr.
A′ B′	= 26.95

The latitude of A′ may be deduced from the value of x by the formula $x'' = \frac{R''\,x}{r}$; r denoting the radius of curvature to the meridian, at the middle point of x, which may be obtained from this equation.

$r = (1 - \alpha\,(2 - 3 \text{ sin.}^2 L)$ Log. r = 7.32031
from whence x = 1226″.5 = 20′ 26″.5 = A A′
26.95 = A′ B′

Difference of latitude	20 53.45
	51 28 40
Latitude of Dover-castle	51 7 46.55

To find the difference of longitude P.

$$P = \frac{R''y}{n \text{ cos. } L}\left(1 - \frac{1}{3}\frac{y^2}{n^2}\text{ tang.}^2 L.\right)$$

Log. $\frac{1}{3}$	9.52288	
Log. $\frac{y^2}{n^2}$	6.32247	
Tang.² L	0.18510	
		1.000000
	6.03045	0.000107
Log. $(1 - \frac{1}{3}\frac{y^2}{n^2}\text{ tang.}^2 L)$	9.9999522	0.999893
Log. R″	5.3144251	
Log. $\frac{y}{n}$	8.1612280	
Comp. cos. L	0.2023792	
	3.6779845 = 4764″ = 1° 19′ 24″	

Example III. *by the Tables.*

Given lat. A. 51° 28′ 40″
x = 124322 = 5.0945480
y = 303775 = 5.4825500
Required lat. B Dover castle.

$A - A' = \frac{R'' x}{n}$

In Table VI. with middle lat. A A' = 51° 18', take 7.9941215
Log. x = 5.0945480

A − A' = 1226 5 = 3.0886695
= 20' 26".5

	1ſt.	2d.
In Table III. with lat. A' take	0.3707524	7.83569
Add log. y^2	0.9651000	0.96510
Tang. L	0.0936983	
1ſt. corr. = 26".88 =	1.4295507	0".06 = 8.80079

A A' = 20' 26".5
Sum of 1 and 2 = 26.94

20 53.44 = diff. of lat. between A and B.
51 28 40

51 7 46.56 Latitude of Dover-caſtle.

Example IV.

Let A. Dunnoſe lat. 50° 37' 8" ∠A'AB = z = 81° 56' 53".
x = 47540 = 4.6770600
y = 336052 = 5.5264065

Required the latitude and longitude of B, Beachy-head?

In Table VI. with lat. 50° 40', take 7.99415
Log. x 4.67706

469".08 = 2.67121

= 7' 49".08
which added to 50° 37 8

gives the lat. of A' 50 44 57.08

In Table III. with lat. A', take 0.3707679
Log. y^2 1.0528130
Tang. L. 0.0877597

1ſt. corr. − 32".46 = 1.5113406

In Table III. 2d. part with lat. A', 7.83759
Log. y^2 1.05281

2d. corr. + 0.077 = 8.89040

The total correction 32".38 taken from the lat. A', leaves the lat. B = 50° 44' 24".74.

To find the Difference of Longitude = $\frac{R'' y}{r \text{ coſ. L}} \left(1 - \frac{1}{3}\frac{y^2}{r^2}\right.$ tang. ^{2}L.)

Log. $\frac{1}{3}$ = 9.52288
$\frac{y^2}{n^2}$ = 6.41016
Tang. L − 0.35104

6.28408 = 0.000192

9.99996 = 0.999808

Brought over 9.99996
R" = 5.31442
$\frac{y}{n}$ = 8.20508
Co. coſ. L = 0.19871

1° 27' 5".8 = 5225.8 = 3.71817

To find the Difference of Azimuth.

$z' = 90° - \frac{R'' y}{n}$ tang. L + $\frac{1}{3}$ R" $\frac{y^3}{n^3}$ tang. L ($\frac{1}{2}$ + tang.^{2} L.)

$\frac{R'' y}{n}$ = 3.5195179 Tang.^{2} L = 0.17552 = 1.49
+ .5

Tang. L = 0.0877471 Log. 0.30059 = 1.99

4049".3 = 3.6073650
Log. $\frac{1}{3}$ = 9.52288
R" = 5.31442
$\frac{y^3}{n^3}$ = 4.61524
Tang. L = 0.08775

9.54029
Log. (tang. L + $\frac{1}{2}$) 0.30059

0".69 = 9.84088

If in this example the normal n be taken from actual obſervation, log. n = 7.32288, the difference of longitude will then be found 1° 26' 47", very nearly the ſame as in the trigonometrical ſurvey.

Note. To the log. of normal in feet, add the conſtant log. 7.4637260, and it will give the number of fathoms in the degree.

And to the log. of number of fathoms add the conſtant log. 2.5362738, and it will give the log. of the normal.

Example V.

Let the latitude of A, Dunnoſe = 50° 37' 7".3
x = 27861
y = 313072 = 5.4956443

Required the latitude and longitude of Blackdown? (Vid. Trigon. Survey, vol. ii. p. 91. Faden's edit.)

The latitude of A' by the general hypotheſis is 50° 41' 41".5
But by the meaſured degree of 60850 feet 50 41 42.1

Tang. L	0.0869004	50 41 42.1
Lat. A',A, Table III.	0.3707715	28.1
Log. y^2	0.9912886	
28.11 =	1.4489605	Lat. B = 50 41 14

To find the Difference of Longitude.

Log. $\frac{1}{3}$ = 9.52288
$\frac{y^2}{n^2}$ = 0.99129
= 5.35737
Tang. ^{2}L = 0.17380

Log. $\left(1 - \frac{1}{3}\frac{y^2}{n^2}\text{ tan.}^2 \text{ L}\right)$ = 6.04534 = 0.000111

Log. 1 − $\frac{1}{3}\frac{y^2}{n^2}$ tan.^{2} L = 9.99995 = 9.999889

Brought over 9.99995

$R'' = 5.31442$

$\frac{y}{n}\begin{cases} = 5.49564 \\ = 2.67869 \end{cases}$

0.19828

$4863''.9 = 3.68698$

$= 1^\circ\ 21'\ 3''.9$

This method of Legendre admits of being ſimplified, when the ſecond correction is conſiderable, by a more judicious uſe of the formula; $\psi = e^2 d\,\text{L}\ \text{coſ.}^2\,\text{L}$.

For, having found $d\,\text{L}$ by the preceding rules, the ſecond correction is obtained by multiplying it by $e^2\ \text{coſ.}^2\,\text{L}$.

Example. To find the Latitude of Dunkirk. Vid. Example I.

$y^2 = 1.4760768$

$\frac{1}{2}\frac{R''}{n^2}$ Tab. III. $= 0.3707755$

Tang. L $= 0.0925526$

$d\,\text{L} = 1.9394049 = 86.977$

Tab. VIII. $e^2\ \text{coſ.}^2\,\text{L} = 7.37272$

$9.31212 = 0.205$

$\text{L} - \text{L}' = 87''.182$

This formula may be verified by the following trigonometrical expreſſion, which is perfectly accurate.

Let L be the latitude of the point A, L′ the lat. of B, P the difference of longitude.

$$\text{Tang. P} = \frac{\text{tang.}\ \phi}{\text{coſ. L}}$$

$$\text{Sin. L} - \text{L}' = \text{ſin. L ſin.}\ \phi\ \text{tang.}\ \frac{\text{P}}{2}\ (1 + e^2\ \text{coſ.}^2\,\text{L})$$

$$\text{Sin. L} - \text{L}' = \text{ſin. L}'\ \text{tang.}\ \phi\ \text{tang.}\ \frac{\text{P}}{2}\ (1 + e^2\ \text{coſ.}^2\,\text{L.})$$

Example.—Greenwich and Dunkirk. See Example I.

$$\phi = \frac{R''y}{n} = 3.7311373 = 5384''.4 = 1^\circ\ 29'\ 44''.4$$

Tang. $\phi = 8.4168110$

Coſ. L $= 9.9983070$

$\text{P} = 2^\circ\ 22'\ 44'' = 8.6185040$

Sin L′ $= 51^\circ\ 2'\ 10'' = 9.8907241$

Tang. $\phi =$ - - 8.4168110

$\text{Tang.}\ \frac{\text{P}}{2} = 1^\circ\ 11'\ 22'' = 8.3172839$

$1 + e^2\ \text{coſ.}^2\,\text{L}$ - - 0.0010194

$\text{Sin L} - \text{L}' =\ 87''.16 = 6.6258384$

The method of M. Delambre is quite independent of the diſtances from the perpendicular and meridian; inſtead of conſidering the diſtance of two points, as meaſured on a great circle paſſing through their verticals, he takes in preference the chords of the arcs.

The obſerved angles are reduced to thoſe of the chords; the baſe muſt likewiſe be reduced to a chord, if the utmoſt preciſion is required.

If B be the length of an arc, its exceſs above its chord Σ is thus found, ρ being the radius of the earth, $\Sigma = \frac{1}{24}\frac{B^3}{\rho^2}$.

In this method, there is no occaſion for a figure, and the diſtance between the parallels may be found without calculating the diſtances to the meridian. There is one inconvenience which, as the author obſerves himſelf, is not inconſiderable, that the latitudes of the ſtations muſt be calculated previouſly to the diſtance between the parallels: but, as the latitudes of the ſtations are generally required, this cannot be conſidered as a ſerious objection.

Let us ſuppoſe at firſt the earth to be ſpherical, and the triangle P A B to be no longer rectangular. Then,

Coſ. P B = coſ. A ſin. P A ſin. A B + coſ. P A coſ. A B;

and agreeable to the above notation,

$$\text{Sin. L}' = \text{coſ. A coſ. L. ſin}\ \phi + \text{ſin. L coſ.}\ \phi:$$

$$\text{Hence, ſin. L} - \text{ſin. L}' = \text{ſin. L} - \text{ſin. L coſ.}\phi - \text{ſin.}\phi\ \text{coſ. A coſ. L}$$
$$= (1 - \text{coſ.}\ \phi)\ \text{ſin. L} - \text{ſin.}\ \phi\ \text{coſ. A coſ. L}$$
$$= 2\ \text{ſin.}^2\ \tfrac{1}{2}\phi\ \text{ſin. L} - \text{ſin.}\ \phi\ \text{coſ. A coſ. L.}$$

But if A be taken exteriorly, that is, if, inſtead of the coſ. A, we ſubſtitute its value taken from the equation $\text{A} = 180^\circ - \text{Z} - \text{coſ. A} = \text{coſ. Z}$:

$$\text{then, ſin. L.} - \text{ſin. L}' = \text{ſin.}\ \phi\ \text{coſ. Z. coſ. L} + 2\ \text{ſin.}^2\tfrac{1}{2}\phi\ \text{ſin. L}:$$

$$\text{or, } 2\ \text{ſin.}\ \tfrac{1}{2}(\text{L} - \text{L}') = \frac{\text{ſin.}\phi\ \text{coſ. Z coſ. L} + 2\ \text{ſin.}^2\tfrac{1}{2}\phi\ \text{ſin. L}}{\text{coſ.}\ \tfrac{1}{2}(\text{L} - \text{L}')}:$$

conſequently,

$$2\ \text{ſin.}\ \tfrac{1}{2}d\,\text{L} = \frac{\text{ſin.}\ \phi\ \text{coſ. Z coſ. L} + 2\ \text{ſin.}^2\ \tfrac{1}{2}\ \phi\ \text{ſin. L}}{\text{coſ.}\ (\text{L} - \tfrac{1}{2}d\,\text{L}}$$
$$= \frac{\text{ſin.}\ \phi\ \text{coſ. Z coſ. L} + 2\ \text{ſin.}^2\ \tfrac{1}{2}\phi\ \text{ſin. L}}{\text{coſ.}\ \tfrac{1}{2}d\,\text{L}\ (\text{coſ. L} + \text{ſin. L tang.}\ \tfrac{1}{2}d\,\text{L}\}}$$

Now, very nearly $2\ \text{ſin.}\ \frac{1}{2}\ d\,\text{L} = \text{ſin.}\ d\,\text{L}$, and $\text{coſ.}\ \frac{1}{2}\ d\,\text{L} = 1$; hence dividing by the coſ. L $\text{ſin.}\ d\,\text{L} = \dfrac{\text{ſin.}\ \phi\ \text{coſ. Z} + 2\ \text{ſin.}^2\ \tfrac{1}{2}\phi\ \text{tang. L}}{1 + \text{tang. L tang.}\ \tfrac{1}{2}d\,\text{L}}$: this expanded by the binomial formula

$\text{ſin.}\ d\,\text{L} = (\text{ſin.}\ \phi\ \text{coſ. Z} + 2\ \text{ſin.}^2\ \frac{1}{2}\phi\ \text{tang. L})\ (1 - \text{tang. L tang.}\ \frac{1}{2}d\,\text{L}\ \ldots.)$

Since $d\,\text{L}$ is very ſmall, the tang. $d\,\text{L}$ may, without ſenſible error, be taken $= \text{ſin.}\ \frac{1}{2}d\,\text{L} = \frac{1}{2}\ \text{ſin.}\ d\,\text{L}$: then the preceding formula becomes

$\text{tang.}\ \frac{1}{2}d\,\text{L} = (\frac{1}{2}\ \text{ſin.}\phi\ \text{coſ. Z} + \text{ſin.}^2\ \frac{1}{2}\ \phi\ \text{tang. L})(1 - \text{tang. L tang.}\ \frac{1}{2}\ d\,\text{L} + \text{tang.}^2\,\text{L tang.}^2\ \frac{1}{2}\ d\,\text{L})$. (1).

Multiplying and rejecting the terms of the third order, $\text{tang.}\ \frac{1}{2}\ d\,\text{L} = \frac{1}{2}\ \text{ſin.}\ \phi\ \text{coſ. Z} + \text{ſin.}^2\ \frac{1}{2}\ \phi\ \text{tang. L} - \frac{1}{2}\ \text{ſin.}\ \phi\ \text{coſ. Z tang.}\ \frac{1}{2}d\,\text{L tang. L}\ \ldots.)$

Subſtitute for tang. $\frac{1}{2}\ d\,\text{L}$ its approximate value $\frac{1}{2}\ \text{ſin.}\ \phi\ \text{coſ. Z}$: then,

$\text{tang.}\ \frac{1}{2}\ d\,\text{L} = \frac{1}{2}\ \text{ſin.}\ \phi\ \text{coſ. Z} + \text{ſin.}^2\ \frac{1}{2}\ \phi\ \text{tang. L} - \frac{1}{4}\ \text{ſin.}^2\ \phi\ \text{coſ.}^2\,\text{Z tang. L.}$

But ſince $\text{coſ.}\ 2\ \text{Z} = 1 - \text{ſin.}^2\,\text{Z}$;

$\text{Tang.}\ \frac{1}{2}d\,\text{L} = \frac{1}{2}\ \text{ſin.}\ \phi\ \text{coſ. Z} + \text{ſin.}^2\ \frac{1}{2}\ \phi\ \text{tang. L} - \frac{1}{4}\ \text{ſin.}^2\ \phi\ \text{tang. L} - \frac{1}{4}\ \text{ſin.}^2\ \phi\ \text{coſ.}^2\ \text{Z tang. L.}$

But $\frac{1}{4}\ \text{ſin.}^2\ \phi = \text{ſin.}^2\ \frac{1}{2}\ \phi$, nearly: hence,

$\text{Tang.}\ d\,\text{L} = \frac{1}{2}\ \text{ſin.}\ \phi\ \text{coſ. Z.} + \frac{1}{4}\ \text{ſin.}^2\ \phi\ \text{ſin.}^2\,\text{Z tang. L}$; (2)

$\text{hence, tang.}\ d\,\text{L or}\ d\,\text{L} = \text{ſin.}\phi\ \text{coſ. Z} + \frac{1}{2}\ \text{ſin.}^2\phi\ \text{ſin.}^2\text{Z tang. L}$
$= \phi\ \text{coſ. Z} + \frac{1}{2}\ \phi\ \text{ſin.}\ \phi\ \text{ſin.}^2\text{Z tang. L.}$

$d\,\text{L}$ expreſſes the difference of the parallels paſſing through the two extremities of the arc ϕ; for a more exact value, we may in the expanſion of equation (1) preſerve the terms of tang.² L. We ſhall find $\text{ſin.}\ d\,\text{L} = \text{ſin.}\ \phi\ \text{coſ. Z} + \frac{1}{2}\ \text{ſin.}^2\phi\ \text{ſin.}^2\,\text{Z tang. L} - \frac{1}{2}\ \text{ſin.}^3\,\phi\ \text{coſ. Z} - \text{ſin.}^2\,\text{Z tang.}^2\,\text{L.}$

But by the reſolution of the triangles, the chord of ϕ is given: ſo that,

$\text{ſin.}\ d\,\text{L} = \text{K coſ.}\ \frac{1}{2}\ \phi\ \text{coſ. Z}\ (1 + \text{tang.}\ \frac{1}{2}\ \phi\ \text{ſin. Z tang. Z tang. L} - 2\ \text{ſin.}\ \frac{1}{2}\ \phi\ \text{ſin.}^2\,\text{Z tang.}^2\,\text{L})$.

This is the value of ſin. $d\,\text{L}$ expreſſed in terms of the ſame meaſure as the chord K: for to have $d\,\text{L}$ itſelf, to this expreſſion muſt be added the exceſs of the arc above the ſign, or,

$$\tfrac{1}{6}\ \text{ſin.}^3\,d\,\text{L} = \tfrac{1}{6}\left(\frac{(\text{K coſ.}\ \tfrac{1}{2}\ \phi\ \text{coſ. Z})^3}{\rho^2}\right);$$

ρ being the radius of the earth in toiſes, fathoms, or metres.

Alſo

Alſo $\frac{1}{6}$ ſin.^{3} dL $= \frac{2}{3}$ (K ſin.$^2 \frac{1}{2} \phi$ coſ.$^2 \frac{1}{2} \phi$ coſ.^{3} Z).

Hence,

dL $=$ K coſ. $\frac{1}{2}\phi$ coſ. Z (1 + tang. $\frac{1}{2}\phi$ ſin. Z tang. Z tang. L $-$ 2 ſin. $\frac{1}{2}\phi$ tang. $\frac{1}{2}\phi$ ſin.^{2} Z tang.^{2} L $+ \frac{2}{3}$ ſin.$^2 \frac{1}{2}\phi$ coſ.^{2} Z).

And finally,

L$'$ $=$ L $-d$L $=$ L $-$ (ϕ coſ. Z $+ \frac{1}{2}\phi$ ſin. ϕ ſin.^{2} Z tang. L)

Such is the approximate value of the latitude of the point B. Now to take into conſideration the eccentricity, we muſt recollect that the exact latitude of B $= 90° -$ P C B; but ſince PCB$=$PMB$-$NBM, and PMP $= 90° -$ L$' -$ (L $- d$L), it follows that the exact latitude B $=$ L $- d$L $- \psi$.

Subſtitute for d L its value found above, and for ψ its value as alſo above determined.

Then denoting the exact latitude by L$'$, we ſhall have L$'$ $=$ L $-$ (ϕ coſ. Z $+ \frac{1}{2}\phi$ ſin. ϕ ſin.^{2} Z tang. L) (1 $+ e^2$ coſ.^{2} L $+ \frac{3}{2} e^2$ ſin. d L ſin. L coſ. L).

In this formula the term $\frac{3}{2} e^2$, &c. may be neglected; then the factor of d L will be reduced to (1 $+ e^2$ coſ.^{2} L). As to the quantity ϕ, it ſhould be expreſſed in ſeconds, and it has already been ſhewn that if K repreſent the chord of an arc, ϕ will be equal to $\frac{\text{K R}''}{\text{normal}}$.

Proceeding to find the azimuth Z$'$, or that of the point A on the horizon of B, the triangle P A B gives this equation:

$$\text{Tang.}\ \tfrac{1}{2}(\text{B} + \text{A}) = \frac{\text{cot.}\ \frac{1}{2}\text{P coſ.}\ \frac{1}{2}(\text{P B} - \text{P A})}{\text{coſ.}\ \frac{1}{2}(\text{P B} + \text{P A})}$$
$$= \frac{\text{cot.}\ \frac{1}{2}\text{P coſ.}\ \frac{1}{2}(\text{L} - \text{L}')}{\text{coſ.}\ (180° - (\text{L} + \text{L}'))}$$
$$= \frac{\text{cot.}\ \frac{1}{2}\text{P coſ.}\ \frac{1}{2}(\text{L} - \text{L}')}{\text{ſin.}\ \frac{1}{2}(\text{L} + \text{L}')}$$

and ſince cot. $= \frac{1}{\text{tang.}}$.

$$\text{Cot.}\ \tfrac{1}{2}(\text{B} + \text{A}) = \text{tang.}\ (90° - \tfrac{1}{2}(\text{B} + \text{A})) = \frac{\text{tang.}\ \frac{1}{2}\text{P ſin.}\ \frac{1}{2}(\text{L} + \text{L}')}{\text{coſ.}\ \frac{1}{2}\ \text{L} - \text{L}}.$$

As $90° - \frac{1}{2}$(B + A) and P are always very ſmall angles:

$$90° - \tfrac{1}{2}(\text{B} + \text{A}) = \frac{\frac{1}{2}\text{P ſin.}\ \frac{1}{2}(\text{L} + \text{L}')}{\text{coſ.}\ \frac{1}{2}(\text{L} - \text{L})}:$$

$$\text{and, B} = (180 - \text{A}) - \frac{\text{P ſin.}\ \frac{1}{2}(\text{L} + \text{L}')}{\text{coſ}\ \frac{1}{2}(\text{L} - \text{L}')} = \text{Z} - \frac{\text{P ſin.}\ \frac{1}{2}(\text{L} + \text{L}')}{\text{coſ.}\ \frac{1}{2}(\text{L} - \text{L}')}.$$

This formula gives the direction B A reckoned north; if it be ſouth of the weſt, we muſt add 180°, and then,

$$\text{Z}' = 180° + \text{Z} - \frac{\text{P ſin.}\ \frac{1}{2}(\text{L}' + \text{L}')}{\text{coſ.}\ \frac{1}{2}(\text{L} - \text{L}')}.$$

The ſame triangle gives,

$$\text{ſin. P} = \frac{\text{ſin. A B ſin. A}}{\text{coſ. L}'} = \frac{\text{ſin.}\ \phi\ \text{ſin. Z}}{\text{coſ. L}} \quad (3).$$

From whence may be deduced,

$$\text{Z}' = 180° + \text{Z} - \frac{\text{ſin.}\ \phi\ \text{ſin. Z ſin}\ \frac{1}{2}\ \text{L} + \text{L}'}{\text{coſ.}\ \frac{1}{2}(\text{L} - \text{L}')\ \text{coſ. L}'}$$
$$= 180° + \text{Z} - \frac{\phi\ \text{ſin. Z}\ \frac{1}{2}(2\text{L}' + d\text{L})}{\text{coſ. L}'\ \text{coſ.}\ \frac{1}{2}\ d\,\text{L}}$$
$$= 180° + \text{Z} - \frac{\phi\ \text{ſin. Z}}{\text{coſ.}\ \frac{1}{2}d\text{L}}\left(\frac{\text{ſin. L}'\text{coſ.}\ \frac{1}{2}d\text{L} + \text{ſin.}\ \frac{1}{2}d\text{L coſ. L}'}{\text{coſ. L}'}\right)$$

$= 180° +$ Z $- \phi$ ſin. Z tang. L$' - \phi$ ſin. Z tang. $\frac{1}{2}\,d$ L: for d L ſubſtitute its value (2), we ſhall have (rejecting the terms of the third order) ſince 2 ſin. Z coſ. Z $=$ ſin. 2 Z, Z$'$ $=$ 180 $+$ Z $- \phi$ ſin. Z tang. L$' - \frac{1}{4}\phi$ ſin. ϕ ſin. 2 Z.

This is the azimuth of A, ſeen on the horizon of B, to which there is nothing to add for the ellipticity of the earth, the effect of which is inſenſible.

As to the longitude M$'$ of the point B, it is clear that it reſults from equation (3); for if M $=$ longitude of A; P $=$ M$' -$ M.

$$\text{And ſin. P, or ſin. (M}' - \text{M)} = \frac{\text{ſin.}\ \phi\ \text{ſin. Z}}{\text{coſ. L}'},$$

$$\text{or nearly exact M}' = \text{M} + \frac{\phi\ \text{ſin. Z}}{\text{coſ. L}'}.$$

If in this expreſſion for L$'$ we ſubſtitute its approximate value L $- \phi$ coſ. Z

$$\text{M}' = \text{M} + \frac{\phi\ \text{ſin. Z}}{\text{coſ. (L} - \phi\ \text{coſ. Z)}}.$$

Expanding the denominator, and conſidering ϕ coſ. Z as a ſmall arc,

$$\text{M}' = \text{M} + \frac{\phi\ \text{ſin. Z}}{\text{coſ. L}\ (1 + \phi\ \text{coſ. Z tang. L}} = \text{M} + \frac{\phi\ \text{ſin. Z}}{\text{coſ. L}}$$

(1 $- \phi$ coſ. Z tang. L).

$$\text{And, finally, M}' = \text{M} + \frac{\phi\ \text{ſin. Z}}{\text{coſ. L}} - \tfrac{1}{2}\phi^2\ \text{ſin. 2 Z}\frac{\text{tang. L}}{\text{coſ. L}}.$$

To recapitulate the preceding reſults;

let ρ $=$ radius of the equator,

e $=$ eccentricity,

ϕ $=$ the arc expreſſed in ſeconds, correſponding with the chord K of a terreſtrial arc, which is one ſide of the triangle,

L $=$ the latitude known of one extremity of the chord K,

L$'$ $=$ the latitude ſought of the other,

M $=$ the longitude known, } reckoned from the ſouth to

M$'$ $=$ the longitude ſought, } the weſt, from 0 to 360,

Z $=$ the azimuth known, } reckoned the ſame.

Z$'$ $=$ the azimuth ſought, }

$$\phi = \frac{\text{K}}{\rho\ \text{ſin. 1}''}(1 - \tfrac{1}{2}e^2\text{ſin.}^2\ \text{L}). \quad (a)$$

L$'$ $=$ L $-$ (ϕ coſ. Z $+ \frac{1}{2}\phi$ ſin. ϕ ſin.^{2} Z tang. L) (1 $+ e^2$ coſ.^{2} L). (b)

Z$'$ $=$ 180 $+$ Z $- \phi$ ſin. Z tang. L$' - \frac{1}{4}\phi$ ſin. ϕ ſin. 2 Z. (c)

$$\text{M}' = \text{M} + \phi\frac{\text{ſin. Z}}{\text{coſ. L}'} = \text{M} + \frac{\phi\ \text{ſin. Z}}{\text{coſ. Z}} - \tfrac{1}{2}\phi^2\text{ſin.}^2\text{Z}\frac{\text{tang. L}}{\text{coſ. L}}. (d)$$

dL, or difference of the parallels in terms of the ſtandard meaſure, as toiſes, fathoms, or metres.

dL $=$ (K coſ. $\frac{1}{2}\phi$ coſ. Z) $+$ (K coſ. $\frac{1}{2}\phi$ coſ. Z) (tang. $\frac{1}{2}\phi$ ſin. Z tang. Z tang. L) $-$ 2 (K coſ. $\frac{1}{2}\phi$ coſ. Z) (ſin. $\frac{1}{2}\phi$ tang. $\frac{1}{2}\phi$ ſin.^{2} L tang.^{2} L) $+$

$$\frac{(\text{ſum of the three firſt terms})^3\ (1 - e^2\ \text{ſin. L})}{6\,\rho^2}.$$

The fourth term of this expreſſion is the exceſs of the arc above the ſine, or $\frac{1}{6}\frac{\text{ſin.}^3\ d\,\text{L}}{r^3}$; here the radius r is that of the earth ſuppoſed ſpherical, if for greater exactneſs we employ the radius of curvature of the arc A B, or $r = \frac{\rho}{(1 - e^2\ \text{ſin.}^2\ \text{L})^{\frac{1}{2}}}$, and inſtead of d L, its value found as above, we ſhall have the term in queſtion.

Example I.

Let the latitude of A be equal 48° 50′ 49″.7; log. of AB (79095.6 feet) $=$ 4.8981525 $=$ K; Z the azimuth of AB, or angle A $=$ 13° 3′ 27″, required the latitude of B?

$$\phi = \frac{\text{K R}''}{\rho}(1 - \tfrac{1}{2}e^2\ \text{ſin.}^2\text{L})\ \text{or} = \frac{\text{K R}''}{\rho\ (1 + e^2\ \text{ſin.}^2\text{L.})}$$

Sin.^{2} L	-	9.7535410	
e^2	-	7.7766329	
0.5	-	9.6989700	
			1.0009000
		7.2291439	= 0.0010949
		9.992653	= 0.9983051

Brought

Brought over	9.9992653	= 0.9983051
K	4.8981515	
R″	5.3144251	
Co. log. ρ	2.6754633	
Log φ	2.8913042	
Cof. z	9.9886204	
758″.446	2.8799246	

φ fin. φ { Log. φ^2	5.78260
Sin. 1″ }	4.68557
Sin.^2 z	8.70794
Tang. L	0.05850
0″.17	9.23461

Its $\frac{1}{2}$ = 0.08 + 758″.446 = 758″.52, which multiplied by 1.0026 = (1 + e^2 cof.² L) is the whole difference of latitude = 760″.4 = 12′ 40″.49; and this difference fubtracted from 48° 50′ 49″.7 (the latitude of A) leaves the latitude of B = 48° 38′ 9″.2.

Example II.

Let AB, the direct diftance of Dover-caftle from Greenwich, be 328231, its azimuth (z) 67° 44′ 34″ S. E.; required the latitude of Dover caftle?

Firft find $\varphi = \frac{\text{K R}''}{\text{normal}}$.

Log. K =	5.5161823
R″ =	5.3144251
Co. log. $n = (\rho\,(1 + \frac{1}{2}\,e^2\,\text{fin.}^2\,\text{L}))$	2.6786812
Log. φ	3.5092886
Cof. z	9.5783707
φ cof. z. = 1223″.64	3.0876593

Log. φ	3.5092886
φ fin. φ { φ^2	7.0185772
Sin. 1″ }	4.6855749
Sin.^2 z	9.9327456
Tang. L	0.0990500
Log. 0.5	9.6989700
$\frac{1}{2}$ φ fin. φ fin.² z tang. L = 27.″22 =	1.4349177

1223″.64 + 27″.22 = 1250.86 its log =	3.0972089
Log. 1 + e^2 cof.² L = 1.002319, (Table IX.) =	0.0010054
Difference of latitude 20′ 53″.73 = 1253.73 =	3.0982143

Which taken from the latitude of Greenwich, leaves 51° 7′ 46″.27.

In a very large triangle, as in this example, the fecond part of the formula of Delambre is not fufficiently exact. Inftead of tang. L, we fhould fubftitute tang. L′, or tang. of the point A′; and for greater exactnefs, the fum of the two corrections fhould be multiplied by the whole expreffion (1 + e^2 cof.² L + $\frac{1}{4}$ e^2 fin. dL, fin. L, cof. L). See Table IX.

If the tang. L′ be taken, the fum of the two corrections is 1223″.64 + 26″.89 = 1250″.53.

Log. 1250.53	3.0970941
.002319 = e^2 cof.² L, Tab. VII. } .000026 = $\frac{1}{4}$ fin. d L, Tab. IX. } .002345	7.3701428
Cor. 2″.93	= 0.4672369

This is to be added to 1250″.53
2 93

1253.46 = 20′ 53″.46 = the difference of latitude required.

Example III.

Given latitude A, (Dunnofe) = 50° 37′ 8″
A B = K = 140580 = 5.1479235,
Z = 20° 58′ 39″ N. E,
Required latitude B, (Butfer-hill)?

Log. $\varphi = \frac{\text{KR}''}{n}$	= 3.1410338
Cof. z	= 9.9702169
1291″.97	= 3.1112507

Log. φ^2	= 6.2820676
Sin. 1″	= 4.6855749
Sin.² Z	= 9.1077694
Tang. L	= 0.0912864
Log. 0.5	= 9.6989700
0″.733	= 9.8656683

1291″.97 + 0″.73 = 1291″.24	3.1110070
e^2 cof.² L, &c. Tab. VII. and IX.	7.3861421
Correction 3″141	= 0.4971491

Which added to 1291.24, gives the difference of latitude required 1294″.38
= 21′ 34″.38

Example IV.

Let A, latitude of Dunnofe = 50° 37′ 8″.
Z = 81° 56′ 53″.
A B = 339398.
Required the latitude of B, Beachy-head?

Log. K	= 5.5307092
$\frac{\text{R}''}{n}$	= 7.9931255
Log. φ	= 3.5238347
Cof. Z	9.1463479
467.93	= 2.6701826

Log.

Log. ϕ^2	-	7.0476694
Sine 1″	-	4.6855749
Sin.² Z	-	9.9913940
Tang. L′	-	0.0875019
Log. 0.5	-	9.6989700
Cor.	32″.44	1.5111102

467″.93 − 32″.44 = 435″.49 = 2.6389782
e^2 cos.² L - - 7.3845326

Cor. - 1″.105 = 0.0235108

Difference of latitude = 435″.49 + 1″.10 = 436.6.

To find Z′ or azimuth of Dunnose, as seen from Beachy-head.

Z′ = 180 + Z ϕ sin. Z, tang. L − ¼ ϕ sin. ϕ, sin.² Z.

ϕ	3.5238228	Log. ¼	9.39794
Sin. Z	9.9956970	ϕ^2	7.04764
Tang. L′	0.0876046	Sin. 1″	4.68557
		Sin.² Z	9.44351
4046.9 =	3.6071244	− 3″.75	0.57466

4046″.9 − 3.7 = 4043″.2 = 1° 7′ 23″.2.

If Z = 98° 3′ 7″, − Z′ = 96° 55′ 43″.8, which is 14″.2 less than the observed azimuth. See Trigon. Survey.

If we suppose the observed azimuth to be correct, namely, 96° 55′ 58″, it would follow, that we have made an erroneous supposition of the value of the normal. The above formula should correct this error, and give the true value.

For ϕ sin. Z, tang. L′ is equal to 4032.7 instead of 4046.9; hence log. ϕ = 3.5222943.

But $\phi \; \frac{R'' K}{\text{normal}}$ ∴ normal = $\frac{K R''}{\phi}$

K	-	= 5.5307092
R″	-	= 5.3144251
Co. log. ϕ		= 6.4777057
Log. n	-	= 7.3228400
$\frac{R''}{3600}$	-	= 1.7581226

Feet. Fathoms.

5.5647174 = 367043 = 61174 = the length of a degree perpendicular to the meridian.

A difference of 5″ in the value of Z′ will produce an error of 47 fathoms in the length of the perpendicular degree.

Example V.

Given AB = K = 140580.4.
Z = 20° 58′ 39″.
L = 50 37 8 = Lat. of A.

Required the distance between the parallels of A and B, Dunnose and Butser-hill.

Log. K = 5.1479235
R″ × co. log. norm. = 7.9931145

3.1410380 = 23′ 3″.6

½ϕ = 11 31.8

Cos. ½ϕ	-	= 9.9999982
K	-	= 5.1479235
Cos. Z	-	= 9.9702169
I.	131259	= 5.1181386

Tang. ½ϕ	-	= 7.5256826
Sin. Z	-	= 9.5538847
Tang. Z	-	= 9.5836737
Tang. L	-	= 0.0857325
		6.7489735
		5.1181306
II.	73.64	= 1.8671041

Sin. ½ϕ	-	= 7.5256801
Tang. ½ϕ	-	= 7.5256826
Sin.² L	-	= 9.7763016
Tang.² L	-	= 0.1714650
		4.9991293
Log. 2	-	= 0.3010300
Log. K ½ϕ cos. Z		5.1181306
III.	2.619	= 0.4182899

Log. 3. first terms		= 5.1186154
× 3	- -	= 5.3558462
Co log. 6	-	= 9.2218487
Co log. Rad.²		= 5.3594627
IV.	0.86	= 9.9371576

I.		131259
II.	−	73.6
III.	+	2.62
IV.	+	0.86
		131188.9

Example VI.

To find the difference between the parallels of Beachy-head and Dunnose.

I. (K cos. ½ϕ cos. Z).
II. + (K cos. ½ϕ cos. Z) tang. ½ϕ sin. Z tang. Z tang. L.
III. − 2 (K cos. ½ϕ cos. Z) sin. ½ϕ tang. ½ϕ sin.² L tang.² L.
IV. + $\frac{(\text{Sum of } 3 \text{ first terms})^3}{6 R^2}$.

Log. ϕ = 3.5238228 = 3340.6 = 55′ 40″.6 = $\phi = \frac{K R''}{\text{norm.}}$
½ϕ = 27 50.3

K	-	= 5.5307092
Cos. Z	-	= 9.1463479
Cos. ½ϕ	-	= 9.9999858
I.	47538.3	= 4.6770429

Tang. ½ϕ		= 7.9043008
Sin. Z	-	= 9.9956970
Tang. Z	-	= 0.8493490
Tang. L	-	= 0.0877597
		8.8411065
Log. (K. cos. ½ϕ cos. Z)		= 4.6770429
II.	+ 3297.2	= 3.5181494

Sin.

Sin. $\frac{1}{2}\phi$	-	$=7.90828$
Tang. $\frac{1}{2}\phi$		$=7.90830$
Sin.^{2} L	-	$=9.77630$
Tang.^{2} L		$=0.17552$
		5.76840
Log. 2	-	$=0.30103$
		4.67704
III.	- -	$-5.579=0.74647$

Log. 44246		$=4.6458740$
		$\times 3=3.9376220$
Co. Log. 6	-	9.2218487
Co. Log. R^2	-	5.3594627
IV.	- -	$0.033=8.5189334$

I.	- -	47538.3
II.	-	$-$ 3297.2
III.	-	$+$ 5.6
IV.	-	$+$ 0.
		44246.6

If ϕ be calculated by the normal, as deduced from actual measurement, the term II. will be found $= 3287.3$, and the total sum $= 44256.5$.

Example VII.

Given the latitude of Blackdown, $50° 41' 14''$.
$Z = 85\ 57\ 37.25$.

Distance between {Blackdown and Dunnose} $K = 314307.5$
and the log. of the normal 7.3228977, as deduced from the measured perpendicular degree 61182 fathoms;

Required the distance between the parallels?

K	- -	$=5.4973541$
R''	- -	$=5.3144251$
Co log. r	-	$=2.6771022$
		$\phi=3082.4=3.4888814$
		$\frac{1}{2}\phi=1542.2$
		$25' 41''.2$.

K	- -	$=5.4973541$
Cos. z	-	$=8.8478695$
Cos. $\frac{1}{2}\phi$	-	$=9.9999879$
I.	- -	$22141.7=4.3452115$

Tang. $\frac{1}{2}\phi$	-	$=7.8733848$
Sin. z	-	$=9.9989198$
Tang. z	-	$=1.1510505$
Tang. L.	-	$=0.0867896$
		9.1101447
		4.3452115
II.	- -	$2853.3=3.4553562$

Sin. $\frac{1}{2}$	-	$=7.87337$
Tang. $\frac{1}{2}\phi$	-	$=7.87338$
Sin.^{2} L	-	$=9.77714$
Tang.^{2} L	-	$=0.17358$
		5.69747
		Log. 2 $=0.30103$
		4.34321
III.	- -	$2.20=0.34371$

I.	-	22141.7
II.	-	$+$ 2853.3
III.	-	$-$ 2.2
		24992.8

To find the difference of longitude $= \phi \frac{\text{sin. Z}}{\text{cos. L}'}$.

ϕ	-	$=3.4888814$
Sin. Z	-	$=9.9989198$
Co-cos. L'		$=0.1975851$
4847.7	-	$=3.6853863$
		$=1° 20' 47''.7$

To find the azimuth of Blackdown, as seen from Dunnose. $Z' = Z - \phi \text{ sin. } Z \text{ tang. } L' - \frac{1}{4}\phi \text{ sin. } \phi \text{ sin. } 2Z$.

ϕ	-	$=3.4888814$
Sin. Z	-	$=9.9989198$
Tang. L'		$=0.0857319$
-3745.7	-	$=3.5735331$

$\frac{1}{4}$	- -	$=9.39794$
ϕ^2	- -	$=6.97776$
$1''$	- -	$=4.68557$
Sin. 2 Z	-	$=9.14781$
$+1.61$	-	$=0.20908$

Total difference $= 3744''.1 = 1° \ 2' 24''.1$
which taken from - $85\ 57\ 37.2$

$84\ 55\ 13.1$

Example VIII.

Given lat. A, Dunnose, $50° 37' 8''$
Z - $84\ 54\ 53$
$AB = K$ - 314307.5, as in the last example: Required the distance between the parallels?

K	$=5.4973541$
Cos. Z	$=8.9476719$
Cos. $\frac{1}{2}\phi$	$=9.9999879$
27862.1	$=4.4450139$

Tang. $\frac{1}{2}\phi$	$=7.8733848$
Sin. Z	$=9.9982871$
Tang. Z	$=1.0506653$
Tang. L	$=0.0857319$
	9.0080691

Brought

Brought over 9.0080691
4.4450139

− 2838.4 = 3.4530830

Tang. $\frac{1}{2}\phi$ = 7.8733848
Sin. $\frac{1}{2}\phi$ = 7.8733735
Tang.^{2} L = 0.1704638
Sin.^{2} L = 9.7762948

5.69351
Log. 2 − 0.30103
4.44501

+ 2.75 = 0.43955

I	-	27862.1
II	−	2838.4
III	+	2.75
		25026.4

Example IX.

Let Z in the last example be supposed 84° 55′ 13″, as it is found by example VI.

K = 5.4973541
Cos. Z = 8.9471485
Cos. $\frac{1}{2}\phi$ = 9.9999879

27829 = 4.4444905

Tang. $\frac{1}{2}\phi$ = 7.8733848
Sin. Z = 9.9982909
Tang. Z = 1.0511425

Brought over 1.0511425
Tang. L = 0.0857319

9.0085501
4.4444905

− 2838.3 = 34530406

+ 2.7 as in last example

2835.6
27829.9

24993.4

These formulæ, though only approximative, are, nevertheless, capable of extreme accuracy. They are, in fact, both identical, only differing in their mode of application. They both imply the resolution of two right-angled spheroidical triangles. In the first method, the triangle A A′ B (*fig.* 66.) is supposed previously resolved; and the formula only relates to the secondary triangle B′ A′ B, in which the side A′ B′ is found subject to a certain correction, arising from having computed it with too long a radius; and, therefore, it has been made a part of too large a sphere, and, of course, its proportionate part in minutes or seconds too small; its correction is ($e^2\, d\,$L, cos.^{2} L + $\frac{3}{2}\, e^2\, d\,$L, sin. $d\,$L); but in so small an arc as A′ B′, the first term is quite sufficient. In the second method, we resolve each triangle separately, and find the arcs A A′ and A′ B′, each subject to the error above-mentioned, which may be very considerable in the first triangle, if it be of great extent; and, therefore, the second part of the correction (for which we have calculated Table IX.) should be applied.

The following example shews the analogy between the two formulæ.

Given lat. A = 51° 28′ 40″
Z = 67 44 34

	Feet.	
x =	124322	Log. 5.0945480
y =	303775	5.4825500
A B =	328231	5.5161773

Required latitude B (Dover-castle.)

Log. x - 5.0945480
Table VI. $\frac{R''}{r}$ = 7.9941230

3.0886710 = 1226″.5

K = 5.5161773
Table II. = 7.9931065

ϕ = 3.5092838
Cos. Z = 9.5783704

3.0876532 = 1223″.64
e^2 cos.^{2} L = 7.37014

0.45779 = 2.87

1226.51

Log. y^2 - - 0.9651000
Tab. III. - 0.3707725
Tang. L. - 0.0937600

1.4296325 = 26.892
Table VIII. - 7.37162 = e^2 cos.^{2} L

8.80125 = 0.06

ϕ^2 = 7.0185676.
Sin. 1″ = 4.6855749
Sin.^{2} Z = 9.9327456
Tang. L = 0.0937600
Log. 0.5 = 9.6989700

1.4296181 = 26″.892
e^2 Cos.^{2} L = 7.37162

8.80125 = 0″.06

1st Cor.

1ſt Cor.	1226.5		= A A′
2d Cor.	26.89	}	= A′B′
3d Cor.	0.06		
	1253.45		= 20′ 53″.45

1ſt Cor.	1223″.64	}	= A A′
2d Cor.	2.87		
3d Cor.	26.89	}	= A′ B′
4th Cor.	0.06		
	1253″.46		= 20′.53″.46

Uſe of the Formula.

$$R'' \frac{x}{r} - \frac{3}{4} R'' \left(\frac{e^2}{1-e^2}\right) \text{ſin. } 2\, l\, \frac{x^2}{r\, n} = l - L'.$$

If, in the above example, we wiſh to find the value A A′ by the above formula, it is eaſy to compute it for one central ſituation, as Greenwich. The following rule will be the reſult. To the log. of the number of feet in

A A′	=	5.0945480
Add. conſtant. log. $\left(\frac{R''}{r}\right)$	=	7.9941110
Which gives Part I. = 1226″.47	=	3.0886590
To double the log. x	=	0.1890960
Add. conſt. log.	=	8.3158923
Which gives Part II. = + 0.032	=	8.5049883

If A′ is ſouth, Part II. is additive.

A′ is north, Part II. is ſubtractive.

In this caſe, A A′ = 1226.47 + 0.03 = 1226.5, as found above in the laſt example. This method, though founded on a complex formula, is very eaſy and convenient in practice. The conſtant log. is thus found:

Log. $\frac{3}{4}$	=	9.8750612
$\frac{e^2}{1-e^2}$	=	7.7792374
R″	=	5.3144251
Co.-log. n	=	2.6786810
Co.-log. r	=	2.6796860
l = 51° 28′ 40″ = Sin. 2 l	=	9.9888016
		8.3158923

If the radius of curvature be required to an arc making an angle V′ with the meridian, it may be found thus:

Rad. of curv. $R = \frac{r+n}{2} - \frac{n-r}{2}$ coſ. 2 V′, r being the rad. of curvature to the meridian, and n the normal; or, more exactly,

$$R = \frac{m\,\frac{r+n}{2} + \frac{n-r}{2}\text{ coſ. } 2\text{ V}'}{(r+n)^2}$$

V′ being the angle which the required arc makes with the perpendicular to the meridian.

In the uſe of theſe formulæ, it ſhould be obſerved, that in the above examples we have taken the elements for calculation, ſuch as are derived from the admiſſion of one hypotheſis applied to every portion of the globe. But from the various anomalies that have occurred in the courſe of the great trigonometrical ſurveys above related, it appears that this hypotheſis muſt be modified, if we wiſh to adapt our calculations to partial ſurveys. For we have ſeen in the preceding examples, that to reduce the ſides of the triangles, as given in linear meaſure, to an expreſſion in terms of the arc, it is neceſſary to know preciſel the radius of curvature to which each reſpective arc ſhould be adapted. Upon the ſuppoſition then of the earth being of ſome irregular figure, or that certain irregularities in the denſity of its ſtrata produce the ſame effect, by the deflection of the plumb-line, from the poſition it would otherwiſe aſſume; in either caſe, we may apply the formulæ above demonſtrated to practice, by chooſing ſuch an ellipſoid, as ſeems beſt adapted to the particular country on which the ſurvey is performed. It is upon this oſculatory ellipſoid that our calculations muſt be made, if we wiſh to determine the true latitudes and longitudes of places, as will moſt probably agree with accurate aſtronomical obſervation.

Thus, in the trigonometrical ſurvey, we find that by meaſuring an arc perpendicular to the meridian, the poſitions of ſeveral points were determined in a great meaſure independent of any hypotheſis. And this is the more neceſſary when a meredian line is interrupted, as is the caſe between Dunkirk and Dunnoſe, when we wiſh to conſider the meridian as meaſured in England as a continuation of that meaſured in France. In ſecondary ſurveys, where the triangles are ſmall, much of the labour of the preceding calculations may be abridged by rejecting the terms of the formulæ that involve e^2, and thus reducing the whole to ſpherical computation; nor will it often be found neceſſary to calculate the ſpherical exceſs, particularly if attention be paid to Le Gendre's theorem. And indeed the knowledge of the ſpherical exceſs might be always diſpenſed with, if we had only to calculate the triangles of the ſtations: but the caſe is different with the triangles which are decompoſed by the meridian line which paſſes through them. In theſe partial triangles, one ſide and two angles are uſually given, from which the third angle is to be deduced by ſubtracting it from 180°; the angles thus determined will be erroneous, if this correction be neglected.

The computed latitudes and longitudes will be but little affected by the omiſſion; but the correction ſhould be attended to, when the difference between the parallels is required with great exactneſs.

But it is very doubtful, if any one hypotheſis can be extended to a conſiderable diſtance from the place of actual obſervation. In example IV. it may be ſeen in what manner the longitude of Dunnoſe was found relatively to Beachyhead, by azimuthal obſervations at each ſtation; and the other longitudes weſtward are computed on a ſuppoſition that a degree of a great circle perpendicular to the meridian continues of the ſame magnitude in a given latitude. But from example IX. and X. taken from the next great triangle weſtward, it appears highly probable that the value of the degree on the perpendicular ſuddenly diminiſhes, and that the ſame irregularities take place in that direction, as have been obſerved in proceeding to the north. From all theſe conſiderations it follows, that the latitudes and longitudes of places, as referring to certain aſtronomical poſitions, can no longer be conſidered as accurate expreſſions to deſignate the relative ſituations of places on the earth. We think therefore that it would be adviſable, in geographical ſurveys of large extent, that the relative latitudes and longitudes to ſome central point ſhould be calculated by the above formulæ or other equivalent methods, and that theſe ſhould be conſidered as

mean

mean latitudes and longitudes. From a careful compariſon of theſe with the aſtronomical poſitions obtained by other means, we may expect to derive a more accurate knowledge of the irregularities in the figure of the earth.

There are many individuals in this country, who poſſeſs inſtruments capable of making geodetical obſervations ſufficiently accurate to throw great light upon this curious ſubject. The great ſurvey ſhould ſerve as a baſis. The obſerver, by means of the known objects already determined, might aſcertain the poſition of any other ſtation, and calculate trigonometrically its diſtance from the meridian, and perpendicular of Greenwich; he ſhould then determine the latitude aſtronomically, and compare it with that deduced from computation, according to the rules already explained. It was to facilitate obſervations of this kind, and to induce the poſſeſſors of ſuch inſtruments to employ them, that we have allotted ſo large a ſpace to this ſubject.

The formulæ we have made uſe of in the foregoing examples were intended only for obſerved triangles, but they may be applied without ſenſible error to a triangle of very conſiderable extent; but ſtill it ſhould be remembered, that the ſuppoſitions upon which they are founded are not ſtrictly true, for the ſides of theſe triangles are lines connecting two given points by the ſhorteſt diſtance over the ſurface of a ſpheroid, and are in fact curve lines of double curvature, except in the caſe of their coincidence with the meridian or equator, that is, their extreme elements are not in the ſame plane. Theſe and other conſiderations of a ſimilar nature, have no ſenſible influence on any practical rule, we ſhall therefore not enter into them any farther at preſent, but refer them to FIGURE *of the Earth*, to which article they more properly belong.

It is of great importance, in a trigonometrical ſurvey, to know the relative heights of the ſtation above the level of the ſea: for this purpoſe it is neceſſary to obſerve the apparent depreſſion of one ſtation as ſeen from the other. For the method of making this obſervation and applying the requiſite corrections, ſee DEPRESSION.

A TABLE to convert Sexageſimal into Decimal Degrees.

°		°		°	
1	1 11 11.11	31	34 44 44.44	61	67 77 77.78
2	3 22 22 22	32	35 55 55.56	62	68 88 88.89
3	3 33 33.33	33	36 66 66.67	63	70 00 00.00
4	4 44 44.44	34	37 77 77.78	64	71 11 11.11
5	5 55 55.56	35	38 88 88.89	65	72 22 22.22
6	6 66 66.67	36	40 00 00.00	66	73 33 33.33
7	7 77 77.78	37	41 11 11.11	67	74 44 44.44
8	8 88 88.89	38	42 22 22.22	68	75 55 55.56
9	10 00 00.00	39	43 33 33.33	69	76 66 66.67
10	11 11 11.11	40	44 44 44.44	70	77 77 77.78
11	12 22 22.22	41	45 55 55.56	71	78 88 88.89
12	13 33 33.34	42	46 66 66.67	72	80 00 00.00
13	14 44 44.45	43	47 77 77.78	73	81 11 11.11
14	15 55 55.56	44	48 88 88.89	74	82 22 22.22
15	16 66 66.67	45	50 00 00.00	75	83 33 33.33
16	17 77 77.78	46	51 11 11.11	76	84 44 44.44
17	18 88 88.89	47	52 22 22.22	77	85 55 55.56
18	20 00 00.00	48	53 33 33.33	78	86 66 66.67
19	21 11 11.10	49	54 44 44.44	79	87 77 77.78
20	22 22 22.22	50	55 55 55.56	80	88 88 88.89
21	23 33 33.33	51	56 66 66.67	81	90 00 00.00
22	24 44 44.44	52	57 77 77.78	82	91 11 11.11
23	25 55 55.56	53	58 88 88.89	83	92 22 22.22
24	26 66 66.68	54	60 00 00.00	84	93 33 33.33
25	27 77 77.79	55	61 11 11.11	85	94 44 44.44
26	28 88 88.89	56	62 22 22.22	86	95 55 55.56
27	30 00 00.00	57	63 33 33.33	87	96 66 66.67
28	31 11 11.11	58	64 44 44.44	88	97 77 77.78
29	32 22 22.22	59	65 55 55.56	89	98 88 88.89
30	33 33 33.33	60	66 66 66.67	90	100 00 00.00

′	°	″	°
1	0.018518	1	0.000308
2	0.037037	2	0.000617
3	0.355556	3	0.000925
4	0.074074	4	0.001234
5	0.092592	5	0.001543
6	0.111111	6	0.001851
7	0.129629	7	0.002159
8	0.148148	8	0.002468
9	0.166666	9	0.002777

TABLES for the reduction of Angles obſerved with the repeating Circle.

TABLE I.

Reduction of the Angles to the Horizon.

Argument. $(H+h)$ and $(H-h)$ $\left\{\begin{array}{l}\text{Sum and Difference of the}\\ \text{Altitude of the Signals.}\end{array}\right.$

5000. ſin. ver. $(H+h.)$

M.	0°+	1°+	2°+	M.	0°+	1°+	2°+
1	0.000	0.787	3.097	31	0.203	1.751	4.822
2	0.001	0.813	3.148	32	0.217	1.790	4.836
3	0.002	0.839	3.200	33	0.230	1.829	4.951
4	0.003	0.866	3.252	34	0.244	1.869	5.016
5	0.005	0.893	3.305	35	0.259	1.909	5.081
6	0.007	0.921	3.358	36	0.274	1.949	5.147
7	0.010	0.949	3.411	37	0.289	1.990	5.213
8	0.013	0.978	3.465	38	0.305	2.031	5.280
9	0.017	1.007	3.520	39	0.321	2.073	5.347
10	0.021	1.036	3.575	40	0.338	2.115	5.414
11	0.026	1.066	3.630	41	0.355	2.158	5.482
12	0.030	1.096	3.685	42	0.373	2.201	5.550
13	0.036	1.127	3.741	43	0.391	2.244	5.619
14	0.041	1.158	3.798	44	0.409	2.288	5.688
15	0.047	1.190	3.855	45	0.428	2.332	5.758
16	0.054	1.222	3.912	46	0.447	2.376	5.828
17	0.061	1.254	3.970	47	0.467	2.421	5.899
18	0.068	1.287	4.028	48	0.487	2.467	5.970
19	0.076	1.320	4.086	49	0.508	2.513	6.041
20	0.081	1.354	4.145	50	0.529	2.559	6.112
21	0.093	1.388	4.205	51	0.550	2.606	6.184
22	0.102	1.422	4.265	52	0.572	2.653	6.257
23	0.112	1.457	4.325	53	0.594	2.701	6.330
24	0.122	1.492	4.386	54	0.617	2.749	6.403
25	0.132	1.528	4.447	55	0.640	2.797	6.477
26	0.143	1.564	4.508	56	0.663	2.846	6.551
27	0.154	1.601	4.570	57	0.687	2.895	6.626
28	0.166	1.638	4.633	58	0.711	2.945	6.701
29	0.178	1.675	4.695	59	0.736	2.995	6.776
30	0.190	1.713	4.758	60	0.761	3.046	6.852

TABLE II.
Arg. (P + Q, and (P − Q.)

Toises. P ± Q	—	Toises. P ± Q.	—
0000	0.000	31000	0.056
1000	0.000	32000	0.060
2000	0.000	33000	0.064
3000	0.001	34000	0.068
4000	0.001	35000	0.072
5000	0.001	36000	0.075
6000	0.002	37000	0.080
7000	0.003	38000	0.085
8000	0.004	39000	0.089
9000	0.005	40000	0.094
10000	0.006	41000	0.098
11000	0.007	42000	0.103
12000	0.008	43000	0.108
13000	0.010	44000	0.113
14000	0.011	45000	0.119
15000	0.013	46000	0.124
16000	0.015	47000	0.129
17000	0.017	48000	0.135
18000	0.019	49000	0.146
19000	0.021	50000	0.146
20000	0.023	51000	0.152
21000	0.026	52000	0.158
22000	0.028	53000	0.164
23000	0.031	54000	0.171
24000	0.034	55000	0.177
25000	0.037	56000	0.184
26000	0.040	57000	0.190
27000	0.043	58000	0.197
28000	0.048	59000	0.204
29000	0.050	60000	0.211
30000	0.053		

TABLE III. Sec. H × sec. *h*.
Arg. H and *h*.

D. M.	0° 0′	0° 30′	1° 0′	1° 30′	2° 0′	2° 30′	3° 0′
	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0 0	00	00	02	03	06	10	14
10	00	01	02	03	06	10	14
20	00	01	02	04	06	10	14
30	00	02	02	04	06	10	14
40	01	02	02	04	07	11	15
50	01	02	03	05	07	11	15
1 0	02	02	03	05	08	11	15
10	02	02	04	06	08	12	16
20	03	03	04	06	09	12	16
30	03	04	05	07	09	13	17
40	04	05	06	08	10	14	18
50	05	05	07	09	11	15	19
2 0	06	06	08	10	12	16	20
10	07	07	09	11	13	17	21
20	08	09	10	12	14	18	22
30	10	10	11	13	16	19	23
40	11	11	12	14	17	20	25
50	12	14	13	16	18	21	26
3 0	14	15	14	17	20	23	27

The cyphers 1.00 at the head of the column are common to all the numbers of the table.

TABLE IV. Argument. Angle to be reduced.

$\left(\frac{0''.0001}{\text{sin. } 1''}\right)$ Tang. $\frac{1}{2}$ A., and $\left(\frac{0''.0001}{\text{sin. } 1''}\right)$ Cot. $\frac{1}{2}$ A.

Angle D. M.	Tang. +	Cot. −	D. M.	Angle D. M.	Tang. +	Cot. −	D. M.
	″	″			″	″	
12 0	2.17	196.25	168 0	20 0	3.64	116.98	160 0
10	2.20	193.54	167 50	10	3.67	115.99	50
20	2.23	190.90	40	20	3.70	115.02	40
30	2.26	188.34	30	30	3.73	114.07	30
40	2.29	185.84	20	40	3.76	113.13	20
50	2.32	183.40	10	50	3.79	112.20	10
13 0	2.35	181.04	167 0	21 0	3.82	111.29	159 0
10	2.38	178.72	50	10	3.85	110.39	50
20	2.41	176.37	40	20	3.88	109.51	40
30	2.44	174.27	30	30	3.92	108.64	30
40	2.47	172.12	20	40	3.95	107.79	20
50	2.50	170.03	10	50	3.98	106.94	10
14 0	2.53	167.99	166 0	22 0	4.01	105.11	158 0
10	2.56	165.99	50	10	4.04	105.30	50
20	2.60	164.04	40	20	4.07	104.49	40
30	2.63	162.14	30	30	4.11	103.70	30
40	2.66	160.27	20	40	4.14	102.91	20
50	2.69	158.45	10	50	4.17	102.14	10
15 0	2.72	156.68	165 0	23 0	4.20	101.38	157 0
10	2.75	154.93	50	10	4.23	100.63	50
20	2.78	153.23	40	20	4.26	99.89	40
30	2.81	151.56	30	30	4.29	99.17	30
40	2.84	149.93	20	40	4.32	98.44	20
50	2.87	148.33	10	50	4.35	97.74	10
16 0	2.90	146.77	164 0	24 0	4.38	97.04	156 0
10	2.93	145.23	50	10	4.41	96.35	50
20	2.96	143.72	40	20	4.45	95.67	40
30	2.99	142.26	30	30	4.48	95.00	30
40	3.02	140.82	20	40	4.51	94.34	20
50	3.05	139.40	10	50	4.54	93.68	10
17 0	3.08	138.02	163 0	25 0	4.57	93.04	155 0
10	3.11	136.66	50	10	4.60	92.40	50
20	3.14	135.32	40	20	4.63	91.77	40
30	3.18	134.01	30	30	4.67	91.16	30
40	3.21	132.73	20	40	4.70	90.54	20
50	3.24	131.47	10	50	4.73	89.34	10
18 0	3.27	130.23	162 0	26 0	4.76	89.95	154 0
10	3.30	129.02	50	10	4.79	88.75	50
20	3.33	127.82	40	20	4.82	88.17	40
30	3.36	126.65	30	30	4.86	87.60	30
40	3.39	125.50	20	40	4.89	87.03	20
50	3.42	124.37	10	50	4.92	86.58	10
19 0	3.45	123.26	161 0	27 0	4.95	85.92	153 0
10	3.48	122.17	50	10	4.98	85.37	50
20	3.51	121.09	40	20	5.02	84.83	40
30	3.55	120.04	30	30	5.05	84.30	30
40	3.58	119.00	20	40	5.08	83.77	20
50	3.61	117.93	10	50	5.11	83.25	10
20 0	3.64	116.98	160 0	28 0	5.14	82.74	152 0
	− Cot.	+ Tang.	D. M. Angle		− Cot.	+ Tang.	D. M. Angle

To the constant log. 1.31443. Add Tang. $\frac{1}{2}$ A, and Cot. $\frac{1}{2}$ A.

The number answering to the sum will be the number of the Table.

TABLE IV.—*continued.*

Angle D. M.	Tang. +	Cot. −	D. M.	Angle D. M.	Tang. +	Cot. −	D. M.	Angle D. M.	Tang. +	Cot. −	D. M	Angle D. M.	Tang. +	Cot. −	D. M.
	″	″			″	″			″	″			″	″	
28 0	5.14	82.74	152 0	37 0	6.90	61.65	143 0	46 0	8.76	48.59	134 0	55 0	10.74	39.62	125 0
10	5.17	82.22	50	10	6.93	61.35	50	10	8.79	48.39	10	10	10.77	39.48	50
20	5.21	81.71	40	20	6.97	61.06	40	20	8.83	48.20	40	20	10.81	39.34	40
30	5.24	81.12	30	30	7.01	60.77	30	30	8.87	48.01	30	30	10.85	39.20	30
40	5.27	80.73	20	40	7.04	60.48	20	40	8.90	47.82	20	40	10.89	39.06	20
50	5.30	80.24	10	50	7.07	60.19	10	50	8.94	47.63	50	50	10.93	38.92	10
29 0	5.33	79.76	151 0	38 0	7.10	59.90	142 0	47 0	8.97	47.44	133 0	56 0	10.97	38.79	124 0
10	5.36	79.28	50	10	7.13	59.62	50	10	9.00	47.25	50	10	11.00	38.65	50
20	5.40	78.81	40	20	7.17	59.34	40	20	9.04	47.06	40	20	11.04	38.52	40
30	5.43	78.34	30	30	7.21	59.06	30	30	9.07	46.88	30	30	11.08	38.39	30
40	5.46	77.83	20	40	7.24	58.79	20	40	9.11	46.69	20	40	11.12	38.25	20
50	5.49	77.49	10	50	7.27	58.52	10	50	9.14	46.51	10	50	11.16	38.12	10
30 0	5.53	76.98	150 0	39 0	7.30	58.25	141 0	48 0	9.18	46.33	132 0	57 0	11.20	37.99	123 0
10	5.56	76.53	50	10	7.33	57.98	50	10	9.21	46.15	50	10	11.23	37.86	50
20	5.59	76.09	40	20	7.37	57.71	40	20	9.25	45.97	40	20	11.27	37.73	40
30	5.62	75.66	30	30	7.40	57.45	30	30	9.29	45.79	30	30	11.31	37.60	30
40	5.66	75.23	20	40	7.44	57.19	20	40	9.32	45.61	20	40	11.35	37.47	20
50	5.69	74.80	10	50	7.47	56.93	10	50	9.36	45.43	10	50	11.39	37.34	10
31 0	5.72	74.38	149 0	40 0	7.51	56.67	140 0	49 0	9.40	45.26	131 0	58 0	11.43	37.21	122 0
10	5.75	73.96	50	10	7.54	56.42	50	10	9.43	45.08	50	10	11.47	37.08	50
20	5.78	73.55	40	20	7.57	56.17	40	20	9.47	44.91	40	20	11.51	36.96	40
30	5.82	73.14	30	30	7.61	55.92	30	30	9.51	44.71	30	30	11.55	36.83	30
30	5.85	72.73	20	40	7.64	55.67	20	40	9.54	44.57	20	40	11.59	36.71	20
50	5.88	72.33	10	50	7.68	55.42	10	50	9.58	44.40	10	50	11.63	36.58	10
32 0	5.91	71.93	148 0	41 0	7.71	55.17	139 0	50 0	9.62	44.23	130 0	59 0	11.67	36.46	121 0
10	5.94	71.54	50	10	7.75	54.93	50	10	9.65	44.06	50	10	11.71	36.33	50
20	5.98	71.15	40	20	7.78	54.69	40	20	9.69	43.90	40	20	11.75	36.21	40
30	6.01	70.77	30	30	7.81	54.45	30	30	9.73	43.73	30	30	11.79	36.09	30
40	6.04	70.39	20	40	7.85	54.21	20	40	9.76	43.57	20	40	11.83	35.91	20
50	6.07	70.01	10	50	7.88	53.97	10	50	9.80	43.40	10	50	11.87	35.75	10
33 0	6.11	69.63	147 0	42 0	7.92	53.73	138 0	51 0	9.84	43.24	129 0	60 0	11.91	35.73	120 0
10	6.14	69.26	50	10	7.95	53.50	50	10	9.87	43.08	50	10	11.95	35.61	50
20	6.18	68.90	40	20	7.98	53.27	40	20	9.91	42.92	40	20	11.99	35.49	40
30	6.21	68.54	30	30	8.02	53.04	30	30	9.95	42.76	30	30	12.03	35.37	30
40	6.24	68.16	20	40	8.05	52.81	20	40	9.98	42.60	20	40	12.07	35.25	20
50	6.27	67.82	10	50	8.08	52.58	10	50	10.02	42.44	10	50	12.11	35.13	10
34 0	6.31	67.47	146 0	43 0	8.12	52.36	137 0	52 0	10.06	42.29	128 0	61 0	12.15	35.02	119 0
10	6.34	67.12	50	10	8.15	52.14	50	10	10.09	42.13	50	10	12.19	34.90	50
20	6.37	66.77	40	20	8.19	51.92	40	20	10.13	41.98	40	20	12.23	34.79	40
30	6.41	66.43	30	30	8.22	51.70	30	30	10.17	41.82	30	30	12.27	34.67	30
40	6.44	66.09	20	40	8.26	51.48	20	40	10.20	41.67	20	40	12.31	34.56	20
50	6.47	65.75	10	50	8.29	51.26	10	50	10.24	41.52	10	50	12.35	34.44	10
35 0	6.50	65.42	145 0	44 0	8.33	51.05	136 0	53 0	10.28	41.37	127 0	62 0	12.39	34.3[illegible]	118 0
10	6.54	65.09	50	10	8.36	50.84	50	10	10.31	41.22	50	10	12.43	34.2[illegible]	50
20	6.57	64.76	40	20	8.40	50.63	40	20	10.35	41.97	40	20	12.47	34.10	40
30	6.60	64.44	30	30	8.43	50.42	30	30	10.39	40.92	30	30	12.51	33.99	30
40	6.64	64.12	20	40	8.47	50.21	20	40	10.43	40.77	20	40	12.56	33.88	20
50	6.67	63.80	10	50	8.50	50.00	10	50	10.47	40.62	10	50	12.60	33.77	10
36 0	6.70	63.48	144 0	45 0	8.54	49.80	135 0	54 0	10.51	40.48	126 0	63 0	12.64	33.66	117 0
10	6.73	63.17	50	10	8.57	49.59	50	10	10.54	40.33	50	10	12.68	33.55	50
20	6.77	62.86	40	20	8.61	49.39	40	20	10.58	40.19	40	20	12.72	33.44	40
30	6.80	62.55	30	30	8.65	49.19	30	30	10.62	40.04	30	30	12.76	33.33	30
40	6.84	62.25	20	40	8.68	48.99	20	40	10.66	39.90	20	40	12.80	33.22	20
50	6.87	61.95	10	50	8.72	48.79	10	50	10.70	39.76	10	50	12.84	33.11	10
0	6.90	61.65	143 0	46 0	8.76	48.59	134 0	55 0	10.74	39.62	125 0	64 0	12.89	33.01	116 0
	−	+	D. M.		−	+	D. M.		−	+	D. M.		−	+	D. M.
	Cot.	Tang.	Angle		Cot.	Tang.	Angle		Cot.	Tang.	Angle		Cot.	Tang.	Angle

TABLE

TABLE IV.—*continued.*

Angle D. M.	Tang. +	Cot. −	D. M.	Angle D. M.	Tang. +	Cot. −	D. M.	Angle D. M.	Tang. +	Cot. −	D. M.
′	″	″			″	″			″	″	
64 0	12.89	33.01	116 0	73 0	15.26	27.87	107 0	82 0	17.93	23.73	98 0
10	12.93	32.90	50	10	15.30	27.78	50	10	17.98	23.66	50
20	12.97	32.80	40	20	15.35	27.70	40	20	18.03	23.59	40
30	13.01	32.69	30	30	15.40	27.62	30	30	18.09	23.52	30
40	13.05	32.58	20	40	15.44	27.53	20	40	18.14	23.45	20
50	13.09	32.48	10	50	15.49	27.45	10	50	18.19	23.38	10
65 0	13.14	32.38	115 0	74 0	15.54	27.37	106 0	83 0	18.25	23.31	97 0
10	13.18	32.28	50	10	15.58	27.28	50	10	18.30	23.24	50
20	13.22	32.17	40	20	15.63	27.20	40	20	18.35	23.17	40
30	13.26	32.07	30	30	15.68	27.12	30	30	18.40	23.11	30
40	13.30	31.97	20	40	15.73	27.04	20	40	18.46	23.04	20
50	13.34	31.87	10	50	15.78	26.96	10	50	18.51	22.97	10
66 0	13.39	31.76	114 0	75 0	15.83	26.88	105 0	84 0	18.57	22.91	96 0
10	13.43	31.66	50	10	15.87	26.80	50	10	18.62	22.84	50
20	13.47	31.56	40	20	15.92	26.72	40	20	18.68	22.77	40
30	13.52	31.46	30	30	15.97	26.64	30	30	18.73	22.70	30
40	13.56	31.36	20	40	16.01	26.56	20	40	18.79	22.63	20
50	13.60	31.26	10	50	16.06	26.48	10	50	18.84	22.56	10
67 0	13.65	31.16	113 0	76 0	16.11	26.40	104 0	85 0	18.90	22.50	95 0
10	13.69	31.06	50	10	16.16	26.32	50	10	18.95	22.43	50
20	13.73	30.96	40	20	16.21	26.24	40	20	19.01	22.37	40
30	13.78	30.87	30	30	16.26	26.16	30	30	19.06	22.30	30
40	13.82	30.77	20	40	16.31	26.08	20	40	19.12	22.24	20
50	13.86	30.67	10	50	16.36	26.00	10	50	19.17	22.18	10
68 0	13.91	30.58	112 0	77 0	16.41	25.93	103 0	86 0	19.23	22.12	94 0
10	13.95	30.48	50	10	16.45	25.85	50	10	19.28	22.05	50
20	13.99	30.39	40	20	16.50	25.77	40	20	19.34	21.99	40
30	14.03	30.29	30	30	16.55	25.70	30	30	19.40	21.92	30
40	14.08	30.20	20	40	16.60	25.62	20	40	19.45	21.86	20
50	14.12	30.10	10	50	16.65	25.54	10	50	19.51	21.80	10
69 0	14.17	30.01	111 0	78 0	16.70	25.47	102 0	87 0	19.56	21.74	93 0
10	14.21	29.91	50	10	16.75	25.39	50	10	19.62	21.67	50
20	14.26	29.82	40	20	16.80	25.32	40	20	19.68	21.61	40
30	14.30	29.73	30	30	16.85	25.29	30	30	19.74	21.54	30
40	14.35	29.64	20	40	16.90	25.17	20	40	19.80	21.48	20
50	14.39	29.55	10	50	16.95	25.09	10	50	19.86	21.42	10
70 0	14.44	29.46	110 0	79 0	17.00	25.02	101 0	88 0	19.92	21.36	92 0
10	14.48	29.37	50	10	17.05	24.94	50	10	19.97	21.29	50
20	14.53	29.28	40	20	17.10	24.87	40	20	20.03	21.23	40
30	14.57	29.19	30	30	17.15	24.80	30	30	20.09	21.17	30
40	14.62	29.10	20	40	17.20	24.72	20	40	20.15	21.11	20
50	14.66	29.01	10	50	17.25	24.65	10	50	20.21	21.05	10
71 0	14.71	28.92	109 0	80 0	17.31	24.58	100 0	89 0	20.27	20.99	91 0
10	14.75	28.83	50	10	17.36	24.50	50	10	20.33	20.93	50
20	14.80	28.74	40	20	17.41	24.43	40	20	20.39	20.87	40
30	14.85	28.65	30	30	17.46	24.36	30	30	20.45	20.81	30
40	14.89	28.56	20	40	17.51	24.29	20	40	20.51	20.75	20
50	14.98	28.47	10	50	17.56	24.22	10	50	20.57	20.69	10
72 0	14.99	28.39	108 0	81 0	17.62	24.15	99 0	90 0	20.63	20.63	90 0
10	15.03	28.30	50	10	17.67	24.08	50		− Cot.	+ Tang.	D. M. Angle
20	15.08	28.21	40	20	17.72	24.01	40				
30	15.12	28.13	30	30	17.77	23.94	30				
40	15.17	28.04	20	40	17.82	23.87	20				
50	15.21	27.95	10	50	17.87	23.80	10				
73 0	15.26	27.87	107 0	82 0	17.93	23.73	98 0				
	− Cot.	+ Tang.	D. M. Angle		− Cot.	+ Tang.	D. M. Angle				

TABLE

TABLE V.

SPHERICAL EXCESS.

Base.	Height. 1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000
	″	″	″	″	″	″	″	″	″	″	″		″	″	″	″
1000	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.14	0.15
2000	0.02	0.04	0.06	0.08	0.10	0.12	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31
3000	0.03	0.06	0.09	0.12	0.14	0.17	0.20	0.23	0.26	0.29	0.32	0.35	0.38	0.41	0.43	0.46
4000	0.04	0.08	0.12	0.15	0.19	0.24	0.27	0.31	0.35	0.39	0.42	0.46	0.50	0.54	0.58	0.62
5000	0.05	0.10	0.14	0.19	0.24	0.29	0.34	0.39	0.43	0.48	0.53	0.58	0.03	0.08	0.72	0.77
6000	0.06	0.12	0.17	0.23	0.29	0.35	0.40	0.46	0.52	0.58	0.64	0.69	0.75	0.81	0.87	0.93
7000	0.07	0.13	0.20	0.27	0.34	0.40	0.47	0.54	0.61	0.68	0.74	0.81	0.88	0.95	1.01	1.08
8000	0.08	0.15	0.23	0.31	0.39	0.46	0.54	0.62	0.69	0.77	0.85	0.93	1.00	1.08	1.16	1.23
9000	0.09	0.17	0.26	0.35	0.44	0.52	0.61	0.69	0.78	0.87	0.95	1.04	1.16	1.22	1.30	1.38
10000	0.10	0.19	0.29	0.39	0.49	0.58	0.68	0.77	0.87	0.96	1.06	1.16	1.25	1.35	1.45	1.54
11000	0.11	0.21	0.32	0.42	0.53	0.64	0.74	0.85	0.95	1.05	1.17	1.27	1.38	1.49	1.59	1.70
12000	0.12	0.23	0.35	0.46	0.58	0.69	0.81	0.93	1.04	1.16	1.27	1.39	1.50	1.62	1.74	1.85
13000	0.13	0.25	0.37	0.50	0.63	0.75	0.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.01
14000	0.14	0.27	0.40	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.48	1.62	1.76	1.89	2.03	2.16
15000	0.15	0.29	0.43	0.58	0.72	0.87	1.01	1.16	1.30	1.45	1.59	1.74	1.88	2.03	2.17	2.31
16000	0.16	0.31	0.46	0.62	0.77	0.93	1.08	1.23	1.39	1.54	1.70	1.85	2.01	2.16	2.31	2.47
17000	0.17	0.33	0.49	0.66	0.82	0.98	1.15	1.31	1.48	1.64	1.80	1.97	2.13	2.30	2.46	2.62
18000	0.18	0.35	0.52	0.69	0.87	1.04	1.22	1.39	1.55	1.74	1.91	2.08	2.26	2.43	2.60	2.78
19000	0.19	0.37	0.55	0.73	0.92	1.10	1.28	1.47	1.65	1.83	2.01	2.20	2.38	2.55	2.75	2.93
20000	0.20	0.39	0.58	0.77	0.96	1.16	1.35	1.54	1.74	1.93	2.12	2.31	2.51	2.77	2.89	3.09
21000	0.21	0.40	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.02	2.23	2.43	2.63	2.84	3.04	3.24
22000	0.22	0.42	0.63	0.85	1.06	1.27	1.49	1.70	1.91	2.12	2.33	2.54	2.76	2.97	3.18	3.39
23000	0.23	0.44	0.66	0.89	1.11	1.33	1.55	1.77	2.00	2.22	2.44	2.65	2.88	3.11	3.33	3.55
24000	0.24	0.46	0.69	0.93	1.16	1.39	1.62	1.85	2.08	2.31	2.54	2.78	3.01	3.24	3.47	3.70
25000	0.25	0.48	0.72	0.96	1.21	1.44	1.69	1.93	2.17	2.41	2.65	2.89	3.13	3.38	3.62	3.85
26000	0.26	0.50	0.75	1.00	1.25	1.50	1.76	2.01	2.26	2.51	2.76	3.01	3.26	3.51	3.76	4.01
27000	0.27	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	2.85	3.12	3.39	3.65	3.91	4.17
28000	0.28	0.54	0.81	1.08	1.35	1.62	1.89	2.16	2.43	2.70	2.97	3.24	3.51	3.78	4.05	4.32
29000	0.29	0.56	0.84	1.12	1.40	1.68	1.96	2.24	2.52	2.80	3.07	3.36	3.64	3.92	4.19	4.47
30000	0.30	0.58	0.87	1.16	1.45	1.74	2.03	2.31	2.60	2.89	3.18	3.47	3.75	4.05	4.34	4.63

The Arguments to this Table are the Base and Height of a Triangle in Toises.

The Toise is to the Fathom as 76.736 to 72.000.

TABLE

TABLES to facilitate the Calculation of Spheroidical Triangles.

Lat.	I. Log. n or Log. of the Normal.	I. Co. log. of n.	II. $\frac{R''}{n}$ or $\frac{R''}{e\sqrt{1-e^2 \text{fin.}^2 L}}$	III. $\frac{1}{2}\frac{R''}{n^2}$	IV. $\frac{1}{2}\frac{R''}{n^2} e^2 \text{fin.}^2 L \text{ cof. } L.$	V. Log. r.	V. Co-log. r.	VI. $\frac{R''}{r}$	VII. $1 + e^2$ cof. ^{2}L. N°.	VII. $1 + e^2$ cof. ^{2}L. Log.	VIII. Log. e^2 cof. ^{2}L.
50 0	7.3212858	2.6787142	7.9931393	0.3708235	7.83976	7.3202148	2.6797852	7.9942103	1.002470	0.0010712	7.3926970
5	2877	7123	1374	8197	954	2204	7796	2047	1.002462	10672	7.3912880
10	2896	7104	1355	8159	931	2260	7740	1991	1.002453	10632	7.3896975
15	2914	7086	1377	8123	908	2316	7684	1935	1.002445	10590	7.3882789
20	2932	7068	1319	8087	884	2372	7628	1879	1.002436	10556	7.3866773
25	2951	7049	1300	8049	860	2428	7572	1823	1.002428	10523	7.3852487
30	2970	7030	1281	8011	836	2484	7516	1767	1.002419	10490	7.3836359
35	2988	7012	1263	7973	811	2540	7460	1711	1.002411	10453	7.3821972
40	3007	6993	1244	7937	786	2596	7404	1655	1.002402	10416	7.3805730
45	3026	6974	1225	7899	761	2652	7348	1599	1.002394	10379	7.3791241
50	3044	6956	1207	7863	732	2708	7292	1543	1.002385	10345	7.3774880
55	3062	6938	1189	7827	707	2764	7236	1587	1.002376	10310	7.3758464
51 0	3081	6919	1170	7789	682	2820	7180	1431	1.002368	10270	7.3743817
5	3100	6899	1151	7749	655	2875	7125	1375	1.002359	10230	7.3727279
10	3118	6882	1133	7715	628	2930	7070	1320	1.002351	10194	7.3712526
15	3136	6864	1115	7679	698	2985	7015	1266	1.002342	10159	7.3695869
20	3155	6845	1096	7643	571	3040	6960	1210	1.002334	10122	7.3681009
25	3174	6826	1077	7603	541	3095	6905	1155	1.002325	10085	7.3664230
30	3192	6808	1059	7567	512	3150	6850	1100	1.002317	10048	7.3649260
35	3210	6790	1041	7531	483	3205	6795	1045	1.002308	10011	7.3632358
40	3228	6772	1023	7495	454	3260	6740	0090	1.002300	09974	7.3617278
45	3247	6753	1004	7457	424	3315	6685	0935	1.002291	09937	7.3600251
50	3266	6734	0986	7419	393	3370	6630	0880	1.002282	09900	7.3583156
55	3284	6716	0968	7383	362	3425	6575	0825	1.002275	09863	7.3569814
52 0	3302	6698	0949	7347	334	3480	6520	0770	1.002266	09826	7.3552599
5	3320	6680	0931	7311	299	3534	6466	0716	1.002257	09788	7.3535316
10	3338	6662	0913	7275	265	3588	6412	0663	1.002249	09753	7.3519895
15	3356	6644	0895	7239	230	3642	6358	0609	1.002240	09717	7.3502480
20	3374	6626	0877	7203	195	3696	6304	0555	1.002232	09680	7.3486942
25	3392	6608	0858	7167	160	3750	6250	0501	1.002224	09643	7.3471348
30	3411	6589	0840	7129	124	3805	6195	0446	1.002216	09610	7.3455698
35	3429	6571	0821	7091	089	3859	6141	0392	1.002207	09577	7.3438023
40	3447	6553	0804	7057	054	2913	6087	0338	1.002199	09540	7.3422252
45	3465	6535	0786	7021	018	3967	6033	0284	1.002191	09503	7.3406424
50	3483	6517	0768	6985	7.82982	4021	5979	0230	1.002182	09465	7.3388547
55	3502	6498	0749	6947	946	4075	5925	0176	1.002173	09428	7.3370597
53 0	3520	6480	0731	6911	911	4130	5870	0121	1.002165	09390	7.3354579

TABLE IX.

Value of the Arc in Seconds.	$\frac{3}{2} e^2 d$ L fin. d L fin. L cof. L. Latitude. 50	51	52	53	Value of the Arc in Seconds.	$\frac{3}{2} e^2 d$ L fin. d L fin. L cof. L. Latitude. 50	51	52	53
100	0.0000021	0.0000021	0.0000021	0.0000021	900	0.0000192	0.0000191	0.0000189	0.0000188
200	0.0000042	0.0000042	0.0000042	0.0000041	1000	0.0000214	0.0000213	0.0000211	0.0000209
300	0.0000064	0.0000063	0.0000063	0.0000062	1100	0.0000235	0.0000234	0.0000232	0.0000230
400	0.0000085	0.0000085	0.0000084	0.0000083	1200	0.0000257	0.0000255	0.0000253	0.0000251
500	0.0000107	0.0000106	0.0000105	0.0000104	1300	0.0000278	0.0000276	0.0000274	0.0000272
600	0.0000128	0.0000127	0.0000126	0.0000125	1400	0.0000299	0.0000297	0.0000295	0.0000292
700	0.0000149	0.0000149	0.0000147	0.0000146	1500	0.0000321	0.0000319	0.0000316	0.0000313
800	0.0000171	0.0000170	0.0000168	0.0000167	1600	0.0000342	0.0000342	0.0000337	0.0000334

A TABLE

A Table of the Meridional Degrees of the Terreſtrial Spheroid calculated to every Degree of Latitude.

Lat. of the middle Point.	Engliſh Feet.	Diff.	Lat. of the middle Point.	Engliſh Feet.	Diff.	Lat. of the middle Point.	Engliſh Feet.	Diff.	Lat. of the middle Point.	Engliſh Feet.	Diff.	Lat. of the middle Point.	Engliſh Feet.	Diff.	Lat. of the middle Point.	Engliſh Feet.	Diff.
0	362909	1	15	363127	30	30	363724	49	45	364546	58	60	365368	48	75	365965	28
1	362910	3	16	363157	32	31	363773	50	46	364604	58	61	365416	47	76	365993	26
2	362913	5	17	363189	34	32	363823	51	47	364662	57	62	365463	46	77	366019	24
3	362918	7	18	363223	35	33	363874	52	48	364720	57	63	365509	45	78	366043	22
4	362925	9	19	363258	37	34	363926	53	49	364777	57	64	365554	44	79	366065	20
5	362934	11	20	363295	38	35	363979	54	50	364834	57	65	365598	43	80	366084	18
6	362945	13	21	363333	39	36	364033	55	51	364891	57	66	365641	41	81	366102	16
7	362958	15	22	363370	40	37	364088	56	52	364948	56	67	365682	40	82	366118	15
8	362973	16	23	363410	41	38	364144	57	53	365004	55	68	365722	39	83	366133	13
9	362989	18	24	363451	43	39	364201	57	54	365059	54	69	365761	38	84	366146	11
10	363007	20	25	363494	44	40	364258	57	55	365113	53	70	365799	37	85	366159	9
11	363027	22	26	363538	45	41	364315	57	56	365166	52	71	365836	35	86	366168	7
12	363049	24	27	363583	46	42	364372	57	57	365218	51	72	365871	33	87	366175	5
13	363073	26	28	363629	47	43	364430	58	58	365269	50	73	365904	31	88	366180	3
14	363099	28	29	363676	48	44	364488	58	59	365319	49	74	365935	30	89	366183	1
15	363127		30	363724		45	364546		60	365368		75	365965		90	366184	

In the above table, the ellipticity is ſuppoſed $\frac{1}{334}$, the degree at the equator, and at 45°, taken from actual meaſurement; and the other, degrees calculated according to the rules explained in the text.

Table of Perpendicular Degrees on the Spheroid calculated to every Degree of the Meridian in Engliſh Feet, (ellipticity $= \frac{1}{334}$.)

Lat.	Perp. Deg.	Diff.	Lat.	Perp. Deg.	Diff.	Lat.	Perp. Deg.	Diff.	Lat.	Perp. Deg.	Diff.	Lat.	Perp. Deg.	Diff.	Lat.	Perp. Deg.	Diff.
0	365094	1	15	365172	9	30	365360	17	45	365640	20	60	365920	17	75	366108	9
1	365095	2	16	365181	10	31	365377	18	46	365660	19	61	365937	16	76	366117	9
2	365097	2	17	365191	10	32	365395	18	47	365679	19	62	365953	16	77	366126	8
3	365099	3	18	365201	10	33	365413	18	48	365698	19	63	365969	15	78	366134	7
4	365102	4	19	365211	11	34	365431	18	49	365717	19	64	365984	14	79	366141	7
5	365106	4	20	365222	11	35	365449	19	50	365736	19	65	365998	13	80	366148	6
6	365110	5	21	365233	12	36	365468	19	51	365755	19	66	366011	12	81	366154	5
7	365115	5	22	365245	12	37	365487	19	52	365774	19	67	366023	12	82	366159	5
8	365120	5	23	365257	12	38	365506	19	53	365793	19	68	366035	12	83	366164	4
9	365125	6	24	365269	13	39	365525	19	54	365812	19	69	366047	11	84	366168	4
10	365131	7	25	365282	14	40	365544	19	55	365831	18	70	366058	11	85	366172	4
11	365138	8	26	365296	15	41	365563	19	56	365849	18	71	366069	10	86	366176	3
12	365146	8	27	365311	16	42	365582	19	57	365867	18	72	366079	10	87	366179	2
13	365156	9	28	365327	16	43	365601	19	58	365885	18	73	366089	10	88	366181	2
14	365163	9	29	365343	17	44	365620	20	59	365903	17	74	366099	9	89	366183	1
15	365172		30	365360		45	365640		60	365920		75	366108		90	366184	

Table of the Degrees of Longitude on the Spheroid, to every Degree of Latitude, computed in Fathoms, the ellipticity being ſuppoſed $\frac{1}{334}$

Lat.	Deg. of Long.	Diff.	2d Diff.	Lat.	Deg. of Long.	Diff.	2d Diff.	Lat.	Deg. of Long.	Diff.	2d Diff.	Lat.	Deg. of Long.	Diff.	2d Diff.	Lat.	Deg. of Long.	Diff.	2d Diff.
	Fath.				Fath.				Fath.				Fath.				Fath.		
0	60849	9		18	57890	336		36	49279	630		54	35835	864		72	18854	1015	
1	60840	28	19	19	57554	354	18	37	48649	645	15	55	34971	175	11	73	17839	1021	6
2	60812	46	18	20	57209	372	18	38	48004	660	15	56	34096	886	11	74	16818	1026	5
3	60766	64	18	21	56828	390	18	39	47344	674	14	57	33211	896	10	75	15792	1030	4
4	60702	83	19	22	56438	407	17	40	46670	688	14	58	32315	906	10	76	14762	1035	5
5	60619	101	18	23	56031	423	16	41	45982	702	14	59	31409	916	10	77	13727	1040	5
6	60518	119	18	24	55608	489	16	42	45280	716	14	60	30493	925	9	78	12687	1044	4
7	60899	138	19	25	55169	455	16	43	44564	732	14	61	29568	939	9	79	11643	1047	3
8	60261	156	18	26	54714	471	16	44	43834	743	13	62	28634	943	9	80	10596	1050	3
9	60105	174	18	27	54243	487	16	45	43091	756	13	63	27691	952	8	81	9546	1053	3
10	59931	192	18	28	53756	503	16	46	42235	769	13	64	26738	960	8	82	8493	1056	3
11	59738	210	18	29	53253	519	16	47	41566	782	13	65	25778	968	8	83	7437	1058	2
12	59527	228	18	30	52734	536	16	48	40784	795	13	66	24810	976	7	84	6379	1060	2
13	59299	246	18	31	52198	552	16	49	39989	808	13	67	23835	983	7	85	5319	1062	2
14	59053	264	18	32	51646	568	16	50	39181	220	12	68	22852	990	7	86	4257	1063	1
15	58789	282	18	33	51078	584	16	51	38361	231	11	69	21863	997	6	87	3194	1064	1
16	58507	300	18	34	50494	600	16	52	37530	842	11	70	20866	1003	6	88	2130	1065	1
17	58207	318	18	35	49894	615	15	53	36688	853	11	71	19863	1009	6	89	1065	1065	0
18	57890			36	49279			54	35835			72	18854			90	0000		

TABLE of Degrees of Longitude on the Sphere to every Degree of Latitude.

Lat.	Fathoms.	Differ.	2d Diff	Lat.	Fathoms.	Differ.	2d Diff.	Lat.	Fathoms.	Differ.	2d Diff	Lat.	Fathoms.	Differ.	2d Diff.
0	60758	9		23	55928	423		46	42206	769		68	22760	986	
1	60749	28	19	24	55505	440	17	47	41437	782	13	69	21774	993	7
2	60721	47	19	25	55065	456	16	48	40655	794	12	70	20781	999	6
3	60674	65	18	26	54609	473	17	49	39861	806	12	71	19782	1005	6
4	60610	83	18	27	54136	490	17	50	39054	818	12	72	18777	1011	6
5	60527	102	19	28	53646	506	16	51	39236	830	12	73	17766	1017	6
6	60425	120	18	29	53140	522	16	52	37406	841	11	74	16749	1022	5
7	60305	139	19	30	52618	538	16	53	36565	852	11	75	15727	1027	5
8	60166	156	17	31	52080	554	16	54	35713	864	12	76	14700	1032	5
9	60010	175	19	32	51526	570	16	55	34849	874	10	77	13668	1006	4
10	59835	193	18	33	50956	585	15	56	33975	884	10	78	12633	1040	4
11	59642	212	19	34	50371	601	16	57	33091	894	10	79	11593	1043	3
12	59430	229	17	35	49770	616	15	58	32197	904	10	80	10550	1046	3
13	59201	248	19	36	49154	631	15	59	31293	914	10	81	9505	1049	3
14	58953	265	18	37	48523	646	15	60	30379	923	9	82	8456	1052	3
15	58688	284	19	38	47878	660	14	61	29456	932	9	83	7404	1054	2
16	58404	301	17	39	47218	675	15	62	28524	940	8	84	6351	1056	2
17	58103	319	18	40	46543	688	13	63	27584	949	9	85	5295	1057	1
18	57784	337	18	41	45855	703	15	64	26635	958	9	86	4238	1058	1
19	57447	354	17	42	45152	716	13	65	25677	965	7	87	3180	1059	1
20	57093	371	17	43	44436	730	14	66	24712	972	7	88	2121	1060	1
21	56722	388	17	44	43706	744	14	67	23740	979	7	89	1060	1060	0
22	56334	406	18	45	42962	756	12	68	22760			90	0000		
23	55928			46	42206										

TABLE of Decimal Degrees of Longitude on a Sphere.

Latitude in Decimal Degrees.	Degrees of Longitude.	Latitude in Decimal Degrees.	Degrees of Longitude.	Latitude in Decimal Degrees.	Degrees of Longitude.	Latitude in Decimal Degrees.	Degrees of Longitude.
	Kiliom.		Kiliom.		Kiliom.		Kil om.
0	100.000	26	91.775	51	69.591	76	36.812
1	99.988	27	91.140	52	68.455	77	35.347
2	99.951	28	90.483	53	67.301	78	33.874
3	99.889	29	89.803	54	66.131	79	32.392
4	99.803	30	89 101	55	64.945	80	30.902
5	99.692	31	88.377	56	63.742	81	29.404
6	99.556	32	87.631	57	62.524	82	27.899
7	99.396	33	86.863	58	61.291	83	26.387
8	99.211	34	86.074	59	60.042	84	24.869
9	99.002	35	85.264	60	58.778	85	23.344
10	98.769	36	84.433	61	57.500	86	21.814
11	98.511	37	83.581	62	56.208	87	20.279
12	98.229	38	82.708	63	54.902	88	18.738
13	97.922	39	81.815	64	53.583	82	17.193
14	97.592	40	80.902	65	52.250	90	15.643
15	97.237	41	79.968	66	50.904	91	14.090
16	96.858	42	79.015	67	49.546	92	12 533
17	96.456	43	78.043	68	48.175	93	10.973
18	96.029	44	77.051	69	46.793	94	9.411
19	95.579	45	76.040	70	45.399	95	7.846
20	95.106	46	75.011	71	43.994	96	6.279
21	94.608	47	73.963	72	42.578	97	4.711
22	94.088	48	72.897	73	41.151	98	3.141
23	94.544	49	71.813	74	39.115	99	1 571
24	92.978	50	70.711	75	38.268	100	0.000
25	92 388						

TABLE of Decimal Degrees of Latitude, the Ellipticity being ſuppoſed $\frac{1}{334}$.

Lat.	Degrees of Latitude.	Differ.	Lat.	Degrees of Latitude.	Differ.
G.	Metres.	M.	G.	Metres.	M.
0	99552.5		50	100006.2	
1	99552.9	0.4	51	100020.3	14.1
2	99553.8	0.9	52	100034.4	14.1
3	99555.1	1.3	53	100048.4	14.0
4	99556.9	1.8	54	100062.4	14.0
5	99559.0	2.1	55	100076.3	13.9
6	99561.8	2.8	56	100090.2	13.9
7	99564.7	3.0	57	100103.9	13.7
8	99568.2	3.5	58	100117.6	13.7
9	99572.1	3.9	59	100131.2	13.6
10	99576.4	4.3	60	100144.6	13.4
11	99581.2	4.8	61	100157.9	13.3
12	99586.3	5.1	62	100171.0	13.1
13	99591.8	5.6	63	100184.0	13.0
14	99597.8	5.9	64	100196.8	12.8
15	99604.2	6.4	65	100209.4	12.6
16	99610.9	6.7	66	100221.7	12.3
17	99618.0	7.1	67	100233.9	12.2
18	99625.4	7.4	68	100245.9	12.0
19	99633.4	8.0	69	100257.5	11.7
20	99641.6	8.2	70	100269.0	11.5
21	99650.2	8.6	71	100280.2	11.2
22	99659.1	8.9	72	100291.1	10.9
23	99668.4	9.3	73	100301.7	10.6
24	99678.0	9.6	74	100312.0	10.3
25	99687.9	9.9	75	100322.0	10.0
26	99698.1	10.2	76	100331.7	9.7
27	99708.6	10.5	77	100341.1	9.4
28	99719.4	10.8	78	100350.1	9.0
29	99730.5	11.1	79	100358.8	8.7
30	99741.9	11.4	80	100367.2	8.4
31	99753.5	11.6	81	100375.1	7.9
32	99765.3	11.8	82	100382.7	7.6
33	99777.4	12.1	83	100389.9	7.2
34	99789.7	12.3	84	100396.8	6.9
35	99802.2	12.5	85	100403.2	6.4
36	99814.9	12.7	86	100409.3	6.1
37	99827.8	12.9	87	100414.9	5.6
38	99840.9	13.1	88	100420.1	5.2
39	99854.1	13.2	89	100424.9	4.8
40	99867.5	13.4	90	100429.3	4.4
41	99881.0	13.5	91	160433.2	3.9
42	99894.6	13.6	92	100436.8	3.6
43	99908.3	13.7	93	100439.9	3.1
44	99922.1	13.8	94	100442.5	2.6
45	99936.0	13.9	95	100444.7	2.2
46	99950.0	13.9	96	100446.5	1.8
47	99964.0	14.0	97	100447.8	1.3
48	99978.0	14.0	98	100448.7	0.9
49	99992.1	14.1	99	100449.2	0.5
50	100006.2	14.1	100		

TABLE of Decimal Degrees of Longitude.

Lat.	Degrees of Longitude.	Differ.	Lat.	Degrees of Longitude.	Differ.
G.	Metres.	M.	G.	Metres.	M.
0	100149.4		50	70922.1	
1	100137.1	12.3	51	69802.6	1119.5
2	100100.3	36.8	52	68665.8	1136.8
3	100038.9	61.4	53	67512.0	1153.7
4	99953.0	85.9	54	66341.3	1170.7
5	99842.5	110.5	55	65154.2	1187.1
6	99707.6	134.9	56	63950.9	1203.3
7	99548.2	159.4	57	62731.7	1219.2
8	99364.3	183.9	58	61496.8	1234.9
9	99156.2	208.1	59	60246.7	1250.1
10	98923.6	232.6	60	58981.5	1265.2
11	98666.8	256.8	61	57701.6	1279.9
12	98385.8	281.0	62	56407.4	1294.2
13	98080.6	305.2	63	55099.1	1308.3
14	97751.3	329.3	64	53777.1	1322.0
15	97398.1	358.2	65	52441.7	1335.4
16	97020.9	377.2	66	51093.1	1348.6
17	96616.9	401.0	67	49731.8	1361.3
18	96195.1	424.8	68	48358.3	1373.6
19	95746.8	448.4	69	46972.4	1385.8
20	95274.9	471.9	70	45574.8	1397.6
21	94779.6	495.3	71	44165.9	1408.9
22	94260.9	518.7	72	42746.0	1419.9
23	93719.1	541.8	73	41315.3	1430.7
24	93154.2	564.9	74	39874.4	1440.9
25	92566.4	587.8	75	38423.4	1451.0
26	91955.8	610.6	76	36962.8	1460.6
27	91322.6	633.2	77	35493.0	1469.8
28	90666.9	655.7	78	34014.2	1478.8
29	89988.9	678.0	79	32527.0	1487.2
30	89288.6	700.3	80	31031.6	1495.4
31	88566.4	722.2	81	29528.5	1508.1
32	87822.4	744.0	82	28017.9	1510.6
33	87056.7	765.7	83	26500.3	1517.6
34	86269.5	787.2	84	24976.1	1524.2
35	85461.0	808.5	85	23445.6	1530.5
36	84631.4	829.6	86	21909.2	1536.4
37	83780.9	850.5	87	20367.3	1541.9
38	82909.7	871.2	88	18820.3	1547.0
39	82018.1	891.6	89	17268.6	1551.7
40	81106.2	911.9	90	15712.6	1556.0
41	80174.1	932.1	91	14152.6	1560.0
42	79222.3	951.8	92	12589.0	1563.6
43	78250.9	971.4	93	11022.3	1566.7
44	77260.1	990.8	94	9452.9	1569.4
45	76250.1	1010.0	95	7881.0	1571.9
46	75221.3	1028.8	96	6307.2	1573.8
47	74173.8	1047.5	97	4731.8	1575.4
48	73108.0	1065.8	98	3155.7	1576.1
49	72024.0	1084.0	99	1577.8	1577.9
50	70922.1	1101.9	100	0.0	1577.8

Degree *of Longitude.* See the preceding article and Longitude.

Degree, in *Civil* and *Canon Law,* denotes an interval in cognation of kinſhip, whereby proximity and remoteneſs of blood are computed.

Degrees are the intervals whereby it is known what perſons are neareſt to the ſtock or root. Or they are the diſtances of one perſon from another in the line of conſanguinity or affinity, reckoned from ſome common parent or anceſtor. See Consanguinity.

We ſay, the ſecond degree, the third degree; Gregory the Great was the firſt who prohibited marriage to the ſeventh degree; which reſtriction was long obſerved: the ſecond council of Lateran, under Innocent III. reſtrained the prohibition to the fourth degree incluſive, that is, to couſin Germans' children. See Marriage.

In computing degrees of conſanguinity, the rule of the civil law is univerſal, either in the direct or collateral, otherwiſe called the oblique line: "Quot ſunt generationes tot ſunt gradus." Every generation in the direct line conſtitutes a different degree, reckoning either upwards or downwards; and this method of computation univerſally obtains, as well in the civil and canon, as in the common law. But in the canon law, the rule is different for the oblique line, and here a diſtinction is made between the equal and unequal oblique line.

In the firſt caſe the rule is, "Quot gradibus perſonæ cognatæ diſtant a communi ſtipiti, tot gradibus inter ſe diſtant." In the ſecond caſe, the rule is, "Quot gradibus perſona remotior diſtat a communi ſtipite tot gradibus perſonæ diſtant inter ſe." Or, generally, in whatſoever degree two perſons, or the moſt remote of them, are diſtant from the common anceſtor, that is the degree in which they are related to each other. Thus, Titius and his brother are related in the firſt degree, becauſe from the father to each of them is counted only one; Titius and his nephew are related in the ſecond degree; for the nephew is two degrees removed from the common anceſtor; *viz.* his own grandfather, the father of Titius. This rule of computation is adopted by our law; though the civilians count upwards from either of the perſons related to the common ſtock, and then downwards again to the other, reckoning a degree for each perſon both aſcending and deſcending. For the true reaſon of the different methods of computing the degrees of conſanguinity, in the civil law on the one hand, and in the canon and common laws on the other; ſee Descent.

Degrees *of Compariſon,* in *Grammar,* are uſually reckoned three, *viz. poſitive, comparative,* and *ſuperlative;* which ſee reſpectively. The ingenious Mr. Harris, (Hermes, p. 197.) in tracing the riſe of compariſon, and its different degrees, obſerves, that they cannot be more than two; one to denote ſimple exceſs, and one to denote ſuperlative. If we were to introduce more degrees than theſe, we ought, he ſays, perhaps, to introduce infinite, which is abſurd. For why ſtop at a limited number, when in all ſubjects, ſuſceptible of intenſion, the intermediate exceſſes are in a manner infinite? There are infinite degrees of *more* white, between the firſt ſimple white, and the ſuperlative, *whiteſt;* the ſame may be ſaid of *more* great, *more* ſtrong, *more* minute, &c. He adds, the doctrine of grammarians about *three* ſuch degrees, which they call the poſitive, the comparative, and the ſuperlative, muſt needs be abſurd; both becauſe in their poſitive there is no compariſon at all, and becauſe their ſuperlative is a comparative, as much as their comparative itſelf; *e. g.* "Socrates was the *moſt wiſe* of all the Athenians." "Homer was the *moſt ſublime* of all poets." Theſe comparatives however, as well the ſimple as the ſuperlative, ſeem ſometimes to part with their relative nature, and only retain their intenſive. Thus, in the degree denoting ſimple exceſs,

"*Triſtior,* et lacrymis oculos ſuffuſa nitentes."
Virg.

In the ſuperlative degree this is more uſual, "Vir doctiſſimus;" Vir fortiſſimus," a moſt learned man, a moſt brave man; that is to ſay, not the *braveſt* and *moſt learned* man, that ever exiſted, but a man poſſeſſing thoſe qualities in an eminent degree. Comparative adverbs are retrenched by expreſſing their force in the primary attributive: thus, inſtead of *more fair,* grammarians ſay *fairer;* inſtead of *moſt fair, faireſt;* and the ſame holds true both in the Greek and Latin. But this practice has reached no farther than to adjectives, or, at leaſt, to participles, ſharing the nature of adjectives. As ſome attributives admit of compariſon, there are others which admit of none. Such, for example, are thoſe which denote that quality of bodies that ariſes from their figure, as when we ſay, a *circular* table, a *quadrangular* court, &c. the reaſon of which is, that a million of things participating the ſame figure, participate it *equally,* if they participate it at all. The ſame holds true in all attributives, denoting definitive quantities, whether continuous or diſcrete, whether abſolute or relative. Thus the *two foot* rule A cannot be *more a two-foot* rule than any other of the ſame length, &c. &c. The reaſon of this is, that there can be no compariſon without intenſion and remiſſion; there can be no intenſion and remiſſion in things always definite. By the ſame reaſoning we perceive the cauſe, why no ſubſtantive is ſuſceptible of theſe comparative degrees. A mountain cannot be ſaid *more to be,* or to exiſt, than a mole-hill, but the *more* and *leſs* muſt be ſought for in their quantities.

Degrees, in *Muſic.* This term has long been ſuperſeded by that of interval. The ſmall intervals, degrees, or intermediate ſteps from a given note to its 4th above, are three in number, the tone major, tone minor, and major ſemi-tone; as *c, d, e, f.*

Degrees or intervals leſs than concords are neceſſary in melody, as by theſe the concords are graduated, and their diſtance aſcertained. Des Cartes, who has been copied by our muſical lexicographer Graſſineau, has rendered his definition of the term *degree* perplexing, and obſcure to ſtudents, by uſing, mathematically, his letters of reference, ſuppoſing A and B the diſtance of a major 3d; whereas, in muſical language, from A to B is but a major 2d. Then he talks of another ſound C put between A and B, which renders the paſſage wholly unintelligible. The following period from Des Cartes is clear and accurate. "It appears," ſays that author, "that degrees (in practical muſic) are the ſmall intervals, of which the concords or harmonical intervals are compoſed." See Interval and Concord. "Muſical degrees are three: the major or greater tone, the leſs or minor tone, and the ſemitone."

The primary cauſe of the invention of ſmall degrees or intervals leſs than concords, and by which concords are divided, and as it were graduated, he judges to have been this, that there would be too great a diſproportion or inequality in their intenſeneſs, which would weary both the finger and the hearer.

Suppoſing A and C the diſtance of a third, if the voice were to proceed immediately, aſcending from A to C, then as C is the acuter ſound it ſtrikes the ear with more force than A; leſt the leap or proportion ſhould prove uneaſy to the performer, another ſound, B, is placed between them, by which, as by a ſtep or degree, we may move upwards or downwards more eaſily, and with leſs exertion of voice.

"Hence

"Hence it appears," continues Descartes, "that the degrees are only certain media contrived to be placed between the extremes of concords, for moderating the inequality, and are only of use with respect to concords, so that when the voice has moved one degree, the ear is not satisfied till we come to the other, which therefore must be concord to the first sound." The substance of what is here alleged amounts to this; that by a proper division of the concording intervals in such as are less remote, the voice will move smoothly and gracefully from one sound to another, and the hearer be prepared for a more exquisite delight in arriving at the completion of the concord, whose extremes are the proper sounds in which the ear finds its expected rest and pleasure.

Degrees, *for the Use of*, in the construction of the scale of music. See Scale.

Degree, in *Universities*, denotes a quality conferred on the students, or members of them, as a testimony of the proficiency in the arts or faculties; and entitling them to certain privileges, precedencies, &c.

The degrees are much the same in the several universities: but the laws of them, and the discipline or exercise previous to their being obtained, differ. The degrees are, *bachelor*, *master*, and *doctor*; instead of the second, in some foreign universities, they have *licentiate*.

In each faculty there are but two degrees, *viz.* *bachelor* and *doctor*, which were anciently called *bachelor* and *master*: nor do the arts admit of more than two, which still retain the denomination of the ancient degrees, *viz.* *bachelor* and *master*. At Oxford, degrees of master and doctor are only conferred once a year, *viz.* on Monday after the seventh of July, when a solemn act is held for the purpose. See Act.

The expences of a degree of doctor in any of the faculties in treats and set fees, usually amount to 100*l.*, and those of a master of arts to 20 or 30*l.*

The degree of bachelor is only conferred in Lent.

To take the degree of bachelor of arts, four years are required, and three more for master of arts. See Bachelor.

At Cambridge, matters are nearly on the same footing, only the discipline is somewhat more severe, and the exercises more difficult. The commencement, which answers to the act of Oxford, is the Monday before the first Tuesday in July. The degrees of bachelor are taken up in Lent, beginning on Ash-Wednesday.

The degree of master of arts is not given till above three years after that of bachelor; during which time the candidate is obliged, three several times, to maintain two philosophical questions in the public schools, and to answer the objections raised against him by a master of arts. He must also keep two acts in the bachelor's school, and declaim one.

For the Degree *of Doctor*, see Doctor.

Degrees conferred on musical students in our universities. The title of *doctor* in music, peculiar to the universities of our own country, according to Anthony Wood, was first conferred in the reign of king Henry II.; but this is fixing it at an earlier period than that in which such a title can be proved to have subsisted at Oxford or Cambridge, or to have been conferred on the professors of other sciences. Spelman, a more nice and accurate sifter of facts, believes that the appellation of doctor was not among the degrees granted to graduates in England, till the reign of king John, about 1207.

It is known that this title was created on the continent about the middle of the twelfth century, as more honourable than that of *magister*, or master, which was become too common. Its original signification implied not only learning and skill, but abilities to *teach*, according to the opinion of Aristotle, who says, that the most certain proof of knowledge in any science is the being able to instruct others. John de Muris begins the second part of his Treatise on Music with the following passage: "Princeps philosophorum Aristoteles ait in principio mathematicæ suæ, omnino scientis signum est posse docere." Musices Tract. MS. Bodl. 300.

The first degree of this kind which was conferred in a public school or academy, was at Bologna, about the year 1130, where, according to Bayle, it was an honour instituted in favour of Irnerius, chancellor to the emperor Lotharius, who was created doctor of civil law. This ceremony soon after was adopted in other universities, and passed from the law to theology.

Peter Lombard is the first doctor in sacred theology upon record in the university of Paris; and John Hambois has been imagined by some to be the first musician who was honoured with the title of doctor in England.

The precise time when this creation extended to the faculties of medicine and music does not appear; nor can the names be found of those professors in either to whom the title was first granted.

It has, however, been frequently remarked (Burney's Hist. Mus. vol. ii.) that during the middle ages music was always ranked among the seven liberal arts, that it was included in the *trivium* and *quadrivium*, and that it was studied by all those who aspired at reputation for learning throughout Europe. The *trivium* comprised the three sciences of grammar, rhetoric, and logic, which teach us how to reason with accuracy and precision; and the *quadrivium* comprehended arithmetic, music, geometry, and astronomy, as the four branches of the mathematics which silently contemplate whatever is capable of being numbered or measured. Now it is remarkable, that, in our universities, music is the only one of these seven sciences that confers degrees on its students; and, in other countries, though theology, law, and medicine bestow this honour, which are *not* of the seven, yet music, which *is*, can aspire at no such distinction.

However, it evidently appears that the music which was regarded as a science by our forefathers, was merely speculative, and such as concerned harmonics, the ratio of musical intervals, and philosophy of sound; and in this sense musical degrees are perhaps but seldom conferred in our universities according to the original spirit of the institution. But the present statutes, not wholly neglecting the gratification of the ear, are more favourable to practical music, and allow candidates for degrees to perform exercises, in which specimens may be furnished of their skill in melody, harmony, and composition, where those sounds are arranged and combined which science measures and fixes by calculation.

By the statutes of the university of Oxford, it is required of every proceeder to the degree of bachelor in music, that he employ seven years in the study or practice of that faculty, and at the end of that term, produce a testimonial of his having so done, under the hands of credible witnesses; and that previous to the supplication of his grace towards this degree, he compose a song of five parts, and perform the same publicly in the music-school, with vocal and instrumental music, first causing to be affixed on each of the doors of the great gates of the schools a programma, giving three days notice of the day and hour of each performance. Of a bachelor proceeding to the degree of doctor, it is required that he shall study five years after the taking his bachelor's degree, and produce the like proof of his having so done as

is requifite in the cafe of a bachelor; and farther, fhall compofe a fong in fix or eight parts, and publicly perform the fame "tum vocibus quam inftrumentis etiam muficis," on fome day to be appointed for that purpofe, previoufly notifying the day and hour of performance in the manner before prefcribed. Such exercife to be performed in the prefence of Dr. Heyther's profeffor of mufic. This being done, the candidate fhall fupplicate his grace in the convocation-houfe, which being granted by both the Savilian profeffors, or by fome matter of arts deputed by them for that purpofe, he fhall be prefented to his degree.

It is obferved by the authors of the "Hiftoire litteraire de la France," tom. vii. p. 142, and tom. ix. p. 200, that in the femi-barbarous ages, mufic was in fuch high eftimation, that no one could omit the ftudy of it who cultivated letters. The learned Gerbert, who arrived at the pontificate by the title of Sylvefter II., and many other illuftrious perfonages, regarded it as the fecond branch of mathematics. But if mufic does no honour to the fciences at prefent, it is little indebted to them for the diftinction of being admitted into their company during fo many ages, as ignorant artifts of talents and fenfibility have perhaps contributed more to her perfection, than all the fublime reveries and profound calculations of men of fcience.

The firft qualification for the degree either of bachelor or doctor in mufic, was formerly the reading and expounding of certain books in Boethius, as the only writings whence knowledge in the principles of the fcience could be acquired. (See the ftatutes of the univerfity.) But the candidate for academical degrees is no longer put to this teft; he is now to compofe an exercife for voices and inftruments in fix or eight parts, which he is to fubmit to the infpection of the mufic profeffor, and to have publicly performed in the mufic fchool of the univerfity.

Wood, in his Fafti, has been able to produce no names of muficians that have been enrolled among the graduates of the univerfity of Oxford before the fixteenth century, though we are told of feveral at Cambridge of an earlier period. Whether Hambois was a member of this univerfity, or of Oxford, does not appear, nor indeed is it precifely known at what time he received his diploma. In Hollinfhed's chronicle, vol. ii. p. 1355, there is an enumeration of the moft eminent men of learning in the reign of Edward IV. among whom the author includes John Hamboys, "an excellent mufician," adding, that "for his notable cunning therein, he was made a doctor of mufic." But academical honours in the faculty of mufic may be traced up to the year 1463, when Henry Habengton was admitted to the degree of bachelor of mufic at Cambridge, and Thomas Saintwix, doctor in mufic, was made mafter of king's college in the fame univerfity.

DEGUELIA, in *Botany*, Aublet Guian. 750. *t.* 300. Juff. 363, a fhrub, three or four feet high, with long, twining branches, pinnate leaves, and fmall white fpicate-papilionaceous flowers, is known only by the defcription and plate of Aublet, who found it near the banks of rivers in Guiana. Juffieu fufpects it to belong to the genus *Geoffræa.*

DEHAM, a town of Arabia, in the country of Yemen; 28 miles W.N.W. of Sana.

DEH-Bouzour, in *Geography*, a town of Perfia, in the province of Irak; 80 miles N.N.W. of Ifpahan.

DEHCHAR, a town of Perfia, in the province of Kerman; 70 miles S.W. of Sirgian.

DEH-Couchek, a town of Perfia, in the province of Irak; 48 miles N.W. of Ifpahan.

DEHDANAH, a town of Perfia, in the province of Khorafan; 60 miles N.E. of Herat.

DEHEWBARTH, one of the fix principalities into which Wales was divided about the clofe of the fixth century; the other five were Gwynedd, Powys, Reynnuc, Efylluc, and Morgannuc; but the moft permanent divifion of the Britifh territories about this time was into three principalities or kingdoms; *viz.* Dehewbarth, Powyfland, and Gwynedd. Dehewbarth, now South-Wales, was the country of the brave Silures; and was anciently divided into the fix diftricts of Cairdigan, now Cardiganfhire, Dyvat, now Pembrokefhire, Cairmarden, now Caermarthenfhire, Morgannuc, now Glamorganfhire, Guent, now Monmouthfhire, and Brecknock, or Brecknockfhire. The chief refidence, or capital of the ancient princes of South-Wales, was Cairmarden, and fometimes Dinevor caftle.

DEHI-COUH, or Dehaka, a town of Perfia, in the province of Lariftan; 9 miles W. of Lar.

DEHI-DOMDE, a town of Perfia, in the province of Farfiftan; 100 miles S.E. of Schiras.

DEHI-GHERDOU, a town of Perfia, in the province of Farfiftan; 100 miles N. of Schiras.

DEHI-KOURD, a town of Perfia, in the province of Lariftan; 21 miles N.W. of Lar.

DEHISCENTIA, a fplitting or feparation of parts, in *Vegetable Phyfiology*, is particularly applied to the opening of capfules, or dry feed-veffels, when they arrive at maturity. The word is alfo ufed for the feafon when this principally happens.

Moft capfules are fo conftructed, that while juicy and verdant, they remain clofed, but when dry, they either fplit afunder by the elafticity of their valves, fometimes, as in *Euphorbia* and its allies, with great force; or their thin fides fhrivel and fhrink, thus forming apertures, as in the Poppy, the Lily, and with great regularity and beauty in fome fpecies of *Ariftolochia*. By this contrivance the feeds are difperfed in dry weather, which is moft favourable to their fuccefs. Some annual fpecies of *Mefembryanthemum* have however been difcovered in the fandy deferts of Africa, whofe capfules expand, and fcatter their feeds, in wet weather only, rain being of fuch rare occurrence there, that they might otherwife lie too long expofed, before they could meet with fufficient moifture to vegetate. See Sm. Introduction to Botany, 277. *t.* 14. *f.* 178.

DEHNE, in *Geography*, a town of Perfia, in the province of Khorafan; 108 miles E. of Mefchid.

DEHORS, Fr. *without*, in *Law*, a word ufed in ancient pleading, when a thing is *without* the land, &c, or *out* of the point in queftion. See Hors *de fon fee.*

DEHTIEZ, in *Geography*, a town of Hungary; 15 miles N.W. of Leopoldftadt.

DEICIDE, Deicida, from *Deus*, *God*, and *cædo*, *I kill*, a term only ufed by fome writers in fpeaking of the condemnation and execution of the Saviour of the world, by Pontius Pilate and the Jews.

Some have objected to the propriety of the term, fince Chrift fuffered and died, not as God, but as man.

DEIDIER, Anthony, in *Biography*, a voluminous writer on almoft every branch of medicine, was the fon of a furgeon of Montpellier. In 1691 he was made doctor in medicine, and in 1697 profeffor of chemiftry. He was alfo honoured with the cordon of the order of St. Michael, and was admitted one of the foreign members of the royal fociety of London. In 1732, being appointed phyfician to the galleys, he quitted Montpellier, and went to Marfeilles, where he died on the 3d of April 1746. Of his works the following have been

been moft noticed: "Experiences fur la Bile, et les cadavres des peftiferes, faites par M.D.; accompagnees des Lettres, &c." Zurich, 1772. He was at Marfeilles while the plague raged there. He attributed the difeafe to a prevailing acid. He injected bile taken from perfons who had died of the plague into the veins of fome dogs, which were almoft immediately killed by the venom: A fenfelefs experiment, from which no ufeful refult could be expected to follow. He tried inunctions with mercury in the difeafe; from which, he fays, no benefit nor mifchief was found to accrue. "Chymie raifonnee, ou l'outache de decouvrir la nature et la maniere d'agir des remedes chymiques les plus en ufage en medicine et en chirurgie." Lyon, 1715, 12mo. Thefe experiments were alfo fruitlefs; they fhew, however, an active and inquifitive turn of mind, which, properly directed, might have been productive of fome profits. In his treatife on the venereal difeafe, he fuppofes the difeafe to be occafioned by a particular fpecies of infect, which mercury had the power of deftroying. He publifhed three volumes of confultations and obfervations, which may be read with advantage, the difeafes being generally correctly defcribed, and the method of treating them fuch as is now commonly practifed. For the titles and accounts of the remainder of his works, fee Haller's Bib. Med. Eloy. Dict. Hift.

DEJECTION, in *Aftrology*, is applied to the planets, when in their detriment, as aftrologers fpeak, *i. e.* when they have loft their force, or influence, as it is pretended, by reafon of their being in oppofition to fome others, which check and counteract them.

Or, it is ufed when a planet is in a fign oppofite to that wherein it has its greateft effect, of influence, which is called its exaltation. Thus the fign Aries being the exaltation of the Sun, the fign Libra is its dejection. See Exaltation.

Dejection, in *Medicine*, from *dejicio*, *I throw off*, properly fignifies the act of ejecting or evacuating the excrements. But it is alfo more commonly applied to the excrements themfelves, thus evacuated; in which fenfe it is of the fame import with *ftool*.

An examination of the condition of the alvine excretions is highly important in the treatment of all acute, and many chronic, difeafes; inafmuch as the fenfible qualities of the excrement indicate, in a confiderable degree, the various difordered ftates of the organs of digeftion, and the alimentary canal, and more particularly of the liver. For, although, in many cafes, both of acute and chronic diforder, thefe morbid conditions of the digeftive organs are the effect of the general, or of fome local derangement of health; yet they become, perhaps in all cafes, by a re-action on the conftitution, the caufes of a continuance of the original maladies, or of new complaints. It has lately been demonftrated, that many difeafes of the fyftem at large either depend altogether upon the morbid ftate of the chylopoietic vifcera, indicated by unnatural fœces, or are fo connected with it, as to ceafe when that morbid ftate is removed by medicine. See Cathartic, and Chorea.

The ancients did not fail to pay attention to the ftools, as well as the other evacuations of the fick; and they deduced their practical inferences, according to their humoral pathology, from the fuppofed crude or concocted ftate of the fœces. But this hypothefis feems to be lefs correctly applicable to the alvine, than to fome other difcharges; and the concoction of the excretions by ftool appears to have only fignified in general their approach to the natural or healthy appearance, and the term crude to have included all the various morbid appearances, which they exhibited. See Crudity and Concoction.

In difeafes of the digeftive organs and inteftines themfelves, the nature of the dejections affords fome of the diagnoftic figns of the nature of the difeafes. In dyfentery, for example, in which the mucous coat of the inteftines is inflamed, the paffage conftricted, and the fœcal matter detained, the ftools confift principally of the flime or mucus of the bowel, or, in more violent cafes, of blood only; and the fœcal matter, if any be difcharged, is in the form of hard balls, or fcybala: in the more advanced ftages, when ulceration has taken place, pieces of coagulated lymph, like membranes, are difcharged, with fanious matter. In fimple diarrhœa, the fœcal matter, though diluted with the ferous effufion from the exhalent veffels of the canal, or mixed with portions of undigefted aliment, paffes off neverthelefs, retaining moft of its other natural qualities. When the fecretion of bile, or its paffage into the inteftines, is interrupted in adults, as in jaundice, the ftools are clayey, and pale, like whitifh-brown paper. In children, when that fecretion is ftopped by the irritation of teething, their diet being chiefly of bread and milk, the fœces are white; and when digeftion is difordered, the biliary fecretion going on, acid is generated in the ftomach, which, mixing with the bile, gives the alvine difcharges a green colour. Inftances occafionally occur, in which a fluid like coffee-grounds in colour and confiftence is vomited, and fimilar matter, of a darker colour and of an offenfive fmell, is difcharged in great quantities *per anum*; fometimes green bile is obferved mixed with thefe difcharges, fometimes none. They confift undoubtedly of blood flowly evacuated, fometimes arifing from the inner furface of the inteftines, fometimes from the liver, and generally occur in fpirit-drinkers. This difeafe has been termed Melæna (μελαινα, black difeafe). On the examination of the bodies of perfons who have died of fuch attack, the lining of the inteftinal canal has been found highly inflamed, and apparently tending to mortification, through the whole extent, fometimes with and at other times without any difeafe of the liver.

In many nervous and febrile diforders of the conftitution, as in chorea, St. Vitus's dance, in hyfteria, in typhus, and fcarlatina, as fhewn by Dr. Hamilton; and in fome more local affections, as pointed out by Mr. Abernethy; the ftools, by their unnatural colour, and fœtid odour, indicate diforder in the chylopoietic organs; and efpecially, as Mr. Abernethy maintains, in the liver and its fecretion, the bile. Medical men, he obferves, entertain various opinions refpecting the colour of the fœces; but to him this property feems generally to depend on the kind and quantity of the bile. All the fecretions, which are poured into the alimentary canal, except the bile, are colourlefs, or white; if, therefore, this fluid were wanting, the refidue of the aliment would be of the colour, which might be expected to refult from fome of its undigefted parts combined; and this is the cafe in jaundice, and fometimes in children, during dentition, as before mentioned. The fœces, voided during a ftate of diforder of the digeftive organs, are fometimes partially coloured; which circumftance cannot be well accounted for upon any other fuppofition, than that of an irregular fecretion of the bile. Befides, fluids fecreted from the inteftines do not ufually enter into combination with the fœcal matter, but appear diftinctly when excreted. Thus we find mucus and jelly difcharged from the bowels, unmixed with the fœces. And, laftly, medicines which affect the liver, produce a very fudden change in the colour of the fœces. Small dofes of mercury, without any alteration of diet, fometimes change the ftools immediately from a blackifh to

a light

a light yellow colour, which indicates a healthy but deficient secretion of bile. Healthy bile, in the human subject, is generally of a deep yellow brown colour; the brown seems to be the result of the yellow colour concentrated. Mr. Abernethy compares it to the colour of wetted rhubarb: for if a small portion of either of these substances be put into a large quantity of water, it will dye it of a bright yellow colour; which is actually the colour of these substances, yet it is so concentrated in the mass as to appear of a deep brown. The quantity of this fluid should be such as completely to dye the excrement of its peculiar colour. By attending, therefore, to the colour of the fœces, the kind and quantity of bile, which the liver excretes, may in general be ascertained.

The colour of the alvine excretions in these disordered states of the viscera, is various. Sometimes they appear to consist of the residue of the food, untinged in the least degree with bile. Sometimes they are of a light yellow colour, which denotes a very deficient quantity of healthy biliary secretion. They may also be of a deep olive, of a clay brown, and of a blackish brown; all of which shew a vitiated state of the biliary secretion. Any kind of brown, which dilution will not convert into yellow, must be considered, according to Mr. Abernethy's principle, as unhealthy; since the colour of the healthy bile is a bright yellow, which by concentration appears brown.

The effects, which medicine or diet may have upon the colour of the fœces, ought, however, to be considered. When the food is coloured, and this colour is not altered by digestion, it will, of course, appear in the fœces; hence if it should be thought desirable to know accurately the state of the biliary secretion, it would be right to restrict patients to a diet that is not likely to colour the fœces. In acute diseases, however, as little or no food is taken, this consideration is superfluous. The green colouring matter of vegetables tinges the fœcal residue of the food. Steel is also known to influence the colour of the fœces, as well as the red varieties of cinchona, and several other drugs. It should also be remarked, that the exposure of fœces to air, after their expulsion, will in some instances cause a considerable alteration of their colour. In our endeavours, therefore, to ascertain whether the liver is performing its office rightly, by observing the colour of the fœces, attention should be paid to such circumstances, lest we should deceive ourselves.

The residue of the alimentary matter, mixed with the bile, passes from the small into the large intestines, and there undergoes a sudden change; it acquires a peculiar fœtor, and becomes what we denominate fœces. This change is so sudden, that it cannot be ascribed to spontaneous chemical alterations, (which would be gradual,) but to some new animal agency. If the contents of the small intestines at their termination, and of the large at their commencement, be examined, they will be found totally different even within a line of each other; the former being without fœtor, and the latter being in all respects what is denominated fœces. The fœces quickly suffer chemical decomposition out of the body, although they often remain in the bowels, without undergoing the same kind of change. Their chemical decomposition is attended with the sudden formation of ammonia; yet if they be examined when recent, they are found to contain acids which ammonia would neutralize. The inference, therefore, naturally arises, that this agency of the large intestines may be designed, among other purposes, so to modify the residue of the alimentary matter, as to prevent it from undergoing those various chemical changes, which might be stimulating to the containing organs, as well as injurious to the general health. In a perfectly healthy state of the digestive organs, probably no chemical decomposition, even of the fœces, takes place; yet such changes happen in some degree, without apparently producing any injurious consequences. To chemical changes we may probably attribute the extrication of inflammable air, and the various and unnatural odour of the fœcal matter, which is observable in disordered states of the digestive viscera. Analogy would lead us to refer the changes, produced in the large intestines, to the effects of a secretion from their lining membrane, which secretion of course will be deranged by a disordered and irritated state of the organs, and a corresponding derangement of the fœcal process must be expected to ensue. See Abernethy, Surgical Observations, vol. ii.

Dr. Hamilton, however, seems to be of opinion, that the fœces undergo a change, when long detained in the intestines, which this change of colour and smell indicates, and he attributes much to the state of constipation or accumulation of fœces in the bowels, which this morbid condition of the dejections accompanies. Hence he considers dark and fœtid excretions from the bowels as indicating the necessity of purgative medicines; which experience has shewn to be salutary under such circumstances, whether in nervous, febrile, or other complaints. See Observations on Purgative Medicines.

The necessity of removing these morbid fœces by cathartics, which also stimulate the bowels, and the adjoining viscera, the liver, and pancreas, is the inference likewise drawn by Mr. Abernethy, from his view of the subject.

The digestive organs are peculiarly liable to derangement in children, so that every disease in them, whether in the teeth, the lungs, or elsewhere, is accompanied with a discharge of unhealthy stools, and laxatives are therefore powerful auxiliaries in the cure of the majority of their complaints.

DEJECTORIA, denote purging medicines.

DEI Facies *Promontorium*, in *Ancient Geography*, a promontory more commonly called from the Greek *Theoprosopon*, situated on the coast of Phœnicia, between Tripolis to the north, and Botrus or Botrys to the south.

DEIFAN, in *Geography*, a town of Arabia, in the country of Yemen; 32 miles north of Sana.

DEIFICATION, in the *Pagan Theology*, the act, or ceremony, of deifying their emperors, *i. e.* of placing them among the gods, and decreeing divine honours to be rendered them. The deification is the same with *apotheosis*; which see.

The deification of the emperors is the only instance in which they departed from their accustomed prudence and modesty. The Asiatic Greeks were the first inventors, and the successors of Alexander the first objects of this servile and impious mode of adulation. It was easily transferred from the kings to the governors of Asia; and the Roman magistrates very frequently were adored as provincial deities, with the pomp of altars and temples, of festivals and sacrifices. (Mengault in vol. i. Acad. Inscript.) It was natural that the emperors should not refuse what the proconsuls had accepted; and the divine honours, which both the one and the other received from the provinces, attested rather the despotism than the servitude of Rome. But the conquerors soon imitated the vanquished nations in the arts of flattery; and the imperious spirit of the first Cæsar too easily consented to assume, during his lifetime, a place among the tutelary deities of Rome. The milder temper of his successor declined so dangerous an ambition, which was never afterwards revived, except by the madness of Caligula

ligula and Domitian. Auguftus, indeed, permitted fome of the provincial cities to erect temples to his honour, on condition that they fhould affociate the worfhip of Rome with that of the fovereign; he tolerated private fuperftition, of which he might be the object; but he contented himfelf with being revered by the fenate and people in his human character, and wifely left to his fucceffor the care of his public deification. A regular cuftom was introduced, that on the deceafe of every emperor, who had neither lived nor died like a tyrant, the fenate by a folemn decree fhould place him in the number of the gods; and the ceremonies of his apotheofis were blended with thofe of his funeral. This loyal, and, as it fhould feem, injudicious profanation, fo abhorrent to our ftricter principles, was received with a very faint murmur (Cicero in Philippic. i. 6. Julian in Cæfaribus.) by the eafy nature of polytheifm; but it was received as an inftitution, not of religion, but of policy. We fhould difgrace the virtues of the Antonines, by comparing them with the vices of Hercules or Jupiter. Hence the characters of Cæfar or Auguftus were far fuperior to thofe of the popular deities. But it was the misfortune of the former to live in an enlightened age, and their actions were too faithfully recorded to admit of fuch a mixture of fable and myftery, as the devotion of the vulgar requires. As foon as their divinity was eftablifhed by law, it funk into oblivion, without contributing either to their own fame, or to the dignity of fucceeding princes. Gibbon's Hift. vol. i.

DEIGGITSCH, in *Geography*, a river of Germany, which runs into the Kainach, about a mile fouth-eaft from Voitfberg.

DEI JUDICIUM, in *Antiquity*, a name given to the old Saxon trial by ordeal; becaufe they thought it an appeal to God, for the juftice of a caufe, and verily believed that the decifion was according to the will and pleafure of divine providence. See ORDEAL.

DEINCLINERS, or DEINCLINING *dials*, are fuch as both decline, and incline or recline, at the fame time.

Suppofe, for inftance, a plane to cut the prime vertical circle at an angle of 30 degrees, and the horizontal plane under an angle of 24 degrees, the elevation of the pole being 52 degrees; a dial, drawn on this plane, is called a *deincliner*. See DIAL.

DEINEK, in *Geography*, a town of European Turkey, in the province of Moldavia; 36 miles weft of Birlet.

DE INJURIA *fua propria, abfque tali caufa*, in *Law*, are words ufed in replications, in actions of trefpafs. (1 Lil. Abr. 427.) When one juftifies by command or authority derived from another, or if a defendant juftifies by authority at common law, as a conftable by arreft for breach of the peace; or if he juftifies by act of parliament, &c.; the plaintiff may reply that he did it of *his own wrong, without any fuch caufe as the defendant has alleged.* Cro. Eliz. 539. 2 Salk. 628. See TRESPASS.

DEINSBURG, in *Geography*, a town of Germany in the duchy of Carinthia; 5 miles north of Ebernftein.

DEINSE, DEINZE, or DEYNSE, a fmall town of France, in the department of the Efcaut, chief place of a canton in the diftrict of Gand, with a population of 2958 individuals, nine miles fouth-weft of Gand, and 15 north-eaft of Courtray. The canton has an extent of 85 kiliometres, 10 communes, and 17,158 inhabitants.

DEJOCES, in *Biography*, the firft king of the Medes, raifed to that honour from the rank of citizen, on account of his zeal in the adminiftration of juftice and equity among his countrymen. His influence as a private man was fo great, that when he ceafed to act, anarchy and confufion feemed always and immediately to prevail: he was, in confequence of this, chofen fovereign about the year B. C. 709. He foon obtained all the honours attaching to that rank in life, and did not fail to magnify the importance of his fituation; and to excite in the minds of his fubjects an awe of his perfon, he would not fuffer himfelf to be feen by any but thofe of his immediate houfehold. He tranfacted all his bufinefs through the medium of fervants and minifters. By thefe means, and by employing a multitude of fpies in all parts of his dominions, he eftablifhed a perfect defpotifm, which he adminiftered with judgment, and with fome degree of feverity. He reigned 53 years; and at his death was fucceeded by his fon Phraortes. Univer. Hift.

DEJOTARUS, firft diftinguifhed as tetrarch of Galatia, and on account of the eminent fervices which he performed in that ftation, and of the figure which he made in the Mithridatic war, was afterwards appointed to the throne of the Leffer Armenia by Pompey, which appointment was confirmed by the fenate. He was highly refpected by moft of the principal people in Rome, and was of much fervice in repreffing many tumults which were excited in the empire. In the civil war between Pompey and Cæfar, he fided with the former, and was on that account deprived of part of his territory, and became tributary to the victorious Cæfar. After his death, Dejotarus, by bribery, recovered his forfeited territories. He intended next to have joined Brutus, but the commander to whofe care he trufted his troops went over to Antony, which was fo far fortunate for him, that on the defeat of Brutus he was permitted to retain his kingdom. He arrived to an advanced age, and, towards the clofe of life, was exceffively devoted to the fuperftitions of the age and country in which he lived, and was governed almoft entirely by omens and auguries. See BAYLE, who has given a very elaborate and learned article of this prince.

DEIPARA, Θεοτοκος. See MOTHER *of God.*

DEIRA, in *Ancient Geography*, one of the two kingdoms, into which the 7th kingdom of the heptarchy, or Northumberland, was divided; comprehending the country between the Humber and the Tyne, whofe capital was York. The other of thefe two kingdoms was Bernicia, or the country between the Tyne and the Forth, whofe capital was Bamburgh. Thefe two kingdoms were united by Ofwald about the middle of the 7th century, into the kingdom of Northumberland.

DEIR-ABULISE, in *Geography*, a town of Egypt; 45 miles fouth-weft of Cairo.

DEIRGEART LOUGH, often called *Lough Derg*, a very large fheet of water in Ireland, into which the river Shannon expands, between the counties of Galway and Clare on one fide, and Tipperary on the other. This lake is about 16 miles long, and from two to fix in breadth, and contains fome, though not many, iflands.

DEIROUT, or DEIRÛT, a large and handfome town of Egypt, fituated on the weftern bank of the Nile, almoft oppofite to Foueh, and about 16 miles fouth-eaft of Rofetta.

DEIS, or DAGUS, the chief table in a monaftery. "Solus in refectorio prandebit fupremus habens vaftellum, priore prandente ad magnam menfam quam *deis* vulgariter appellamus."

It is thus called from a cloth called dais, with which the tables of kings were covered.

DEISM, the doctrine or belief of the Deifts.

Deifm, Theifm, from Θεος, *God*, may properly be ufed to denote natural religion, as comprehending thofe truths which have a real foundation in reafon and nature; and in this fenfe it is fo far from being oppofite to Chriftianity, that it is one great defign of the Gofpel to illuftrate and enforce

enforce it. Thus some of the deistical writers have affected to use it; but deism more precisely signifies that system of religion, relating both to doctrine and practice, which every man is to discover for himself by the mere force of natural reason, independent of all revelation, and exclusive of it; and this religion Dr. Tindal, and others, pretend is so perfect, as to be incapable of receiving any addition or improvement, even from divine revelation.

It has not been, however, uncommon to boast of the perfection of this religion in consequence of the assistance which it has received from revelation, though its advocates are neither sufficiently humble nor candid to acknowledge it. Natural religion, with the clear views and extraordinary helps which it derives from the Scriptures of divine truth, is very different with regard to extent and evidence, from what it would have been without supernatural direction and assistance. It is not easy to determine what unaided reason might have done, and how far it might have discovered the principles and duties of religion; because, in every period of time, its powers have been more or less assisted by divine revelation, the benefits of which have been transmitted from one age to another. Under the dispensation of Christianity, more especially, men have been taught to reason justly concerning religious truth and duty by the aid of revelation, though they have not duly acknowledged their obligations. It therefore becomes those who urge the perfection of natural religion as an argument against the necessity of divine revelation, to consider to what this perfection is owing; and whether they are not indebted for it to those extraordinary communications, of which they have availed themselves, and which, being no farther necessary, they depretiate and discard. Some persons, however, whilst they have boasted of the perfection of natural religion, have disparaged Christianity on account of the difficulties that embarrass the investigation of some of its doctrines and discoveries. It behoves such persons to consider how far this kind of reasoning may be urged against other systems both of religion and philosophy, which they themselves profess to admit. Are there not in *deism* itself, the most simple, as it is deemed, of all religious opinions, several difficulties, for which human reason can but ill account, which may therefore be not improperly styled "articles of faith?" Such is the origin of evil under the government of an all-good and all-powerful God; such is the reconciling of the prescience of God, with the free-will of man, which, after much thought on the subject, Mr. Locke, (Letter to Mr. Molyneux, p. 509, vol. iii.) fairly confesses he could not do, though he acknowledges both; such is also the creation of the world at any supposed time, or the eternal production of it from God, &c. &c. But because of these difficulties, or any others that may occur in the system of deism, no wise man will deny the *being* of God; or his *infinite wisdom, goodness*, and *power*, which are proved by such evidence as carries the clearest and strongest conviction, and cannot be refuted without involving the mind in *far greater difficulties*, even in downright *absurdities* and *impossibilities*. The only part, therefore, that can be taken is, to account in the best manner that our weak reason is able to do, for such seeming objections; and when *that* fails, to acknowledge its weakness, and acquiesce under the certainty that our very imperfect knowledge or judgment cannot be the measure of the divine wisdom, or the universal standard of truth. So it is likewise with respect to the *Christian religion*. Some *difficulties* occur in that revelation, which human reason can hardly clear; but as the truth of it stands upon evidence so strong and convincing, that it cannot be denied without much *greater difficulties* than those that attend the belief of it, we ought not to reject it upon such objections, however mortifying they may be to our pride. *That* indeed would have all things made plain to us; but God has thought proper to proportion our knowledge to our *wants*, not to our *pride*. All that concerns our *duty* is clear; and as to other points either of natural or revealed religion, if he has left some obscurities in them, is that any reasonable cause of complaint? Not to rejoice in the benefit of what he has graciously allowed us to know, from a presumptuous disgust at our incapacity of knowing more, is as absurd as it would be to refuse to *walk*, because we cannot *fly*. From the arrogant ignorance of metaphysical reasonings, aiming at matters above our knowledge, arose all the speculative impiety, and many of the worst superstitions, of the old Heathen world, before the Gospel was preached to bring men back again to the primitive faith; and from the same source have since flowed some of the greatest corruptions of the evangelical truth, and the most inveterate prejudices against it; an effect just as natural as for our eyes to grow weak and even blind, by being strained to look at objects too distant, or not made for them to see. If the *external* evidence of our religion be convincingly strong, and there is no *internal* proof of its falsehood, but much to support and confirm its truth; then surely no difficulties ought to prevent our giving a full assent and belief to it. It is our duty indeed to endeavour to find the best solutions we can to them; but where no satisfactory ones are to be found, it is no less our duty to acquiesce with humility, and believe that to be right which we know is above us, and belonging to a wisdom superior to ours. In the present comparison of deism with Christianity, and in contrasting the one against the other, with a view to the perfection of either, we have been led to mention the difficulties that attend both the one and the other; but the difficulties to which we refer, as peculiar to Christianity, are such as attend the belief of the Gospel in some of its pure and essential doctrines, plainly and evidently delivered; which, being made known to us by a *revelation* supported by *proofs* that our reason *ought to admit*, and not being such things as it could *certainly know to be false*, must be received by it as *objects of faith*, though they are such as it could not have discovered by any natural means, and such as are difficult to be conceived, or satisfactorily explained, by its limited powers. If the *glorious light of the Gospel* be sometimes overcast with clouds of doubt, so is the light of our *reason* too. But shall we deprive ourselves of the advantage of *either*, because those clouds cannot perhaps be entirely removed, while we remain in this mortal life? Shall we obstinately and frowardly shut our eyes against "that day-spring from on high that hath visited us," because we are not as yet able to bear the full blaze of his beams? Shall man presume that his weak and narrow understanding is sufficient to guide him *into all truth*, without any need of *revelation* or *faith*? Shall he complain that "the ways of God are not like his ways, and past his finding out?" True philosophy, as well as true Christianity, would teach us a wiser and more modest part. It would teach us to be content within those bounds which God has assigned to us, "casting down imaginations, and every high thing that exalteth itself against the knowledge of God, and bringing into captivity every thought to the obedience of Christ." Lyttelton on the Conversion of St. Paul.

DEISTS, a class of people known also under the denomination of *Free-thinkers*, whose distinguishing character it is, not to profess any particular form, or system, of religion; but only to acknowledge the existence of a God, and to follow the light and law of nature, rejecting revelation, and opposing Christianity.

This name seems to have been first assumed, as the denomination of a party, about the middle of the sixteenth century,

tury, by fome gentlemen in France and Italy, who were defirous of thus difguifing their oppofition to Chriftianity by a more honourable appellation than that of atheifts. Viret, an eminent reformer, mentions certain perfons in his epiftle dedicatory, prefixed to the fecond tome of his "Inftruction Chretienne," publifhed in 1563, who called themfelves by a new name, that of Deifts. Thefe, he tells us, profeffed to believe in God, but fhewed no regard to Jefus Chrift, and confidered the doctrines of the apoftles and evangelifts as fables, and dreams. He adds, that they laughed at all religion, though they outwardly conformed to the religion of thofe with whom they lived, or whom they wifhed to pleafe, or feared to offend. Some, he obferves, profeffed to believe the immortality of the foul; others denied both this doctrine and that of providence. Many of them were confidered as perfons of acute and fubtil genius, and took pains in diffeminating their notions. See Bayle's Dict. art. VIRET. vol. v. or Leland's View of the Deiftical Writers, vol. i. p. 2.

The Deifts hold, that, confidering the multiplicity of religions, the numerous pretences to revelation, and the precarious arguments generally advanced in proof thereof, the beft and fureft way is, to return to the fimplicity of nature, and the belief of one God; which is the only truth agreed to by all nations.

They complain that the freedom of thinking and reafoning is oppreffed under the yoke of religion; and that the minds of men are ridden, and tyrannized, by the neceffity impofed on them of believing inconceivable myfteries; and contend, that nothing fhould be required to be affented to, or believed, but what their reafon clearly conceives. See DEISM.

The diftinguifhing character of modern Deifts is, that they reject all revealed religion, and difcard all pretences to it, as the effects of impofture and enthufiafm. They profefs a regard for natural religion, though they are far from being agreed in their notions concerning it. They are claffed by fome of their own writers into mortal and immortal Deifts: the latter acknowledging a future ftate, and the former denying it, or reprefenting it as very uncertain. Oracles of Reafon, p. 99.

Dr. Clarke diftinguifhes four forts of Deifts. 1. Thofe who pretend to believe the exiftence of an eternal, infinite, independent, intelligent Being, who made the world, without concerning himfelf in the government of it. 2. Thofe who believe the being and natural providence of God, but deny the difference of actions, as morally good or evil, refolving it into the arbitrary conftitution of human laws; and therefore they fuppofe that God takes no notice of them. With refpect to both thefe claffes, he obferves that their opinion can confiftently terminate in nothing but downright atheifm. 3. Thofe who having right apprehenfions concerning the nature, attributes, and all-governing providence of God, feem alfo to have fome notion of his moral perfections, though they confider them as tranfcendent, and fuch in nature and degree, that we can form no true judgment, nor argue with any certainty concerning them: but they deny the immortality of human fouls, alleging that men perifh at death, and that the prefent life is the whole of human exiftence. 4. Thofe who believe the exiftence, perfections, and providence of God, the obligations of natural religion, and a ftate of future retribution, on the evidence of the light of nature, without a divine revelation: fuch as thefe, he fays, are the only true Deifts, but their principles, he apprehends, fhould lead them to embrace Chriftianity; and therefore he concludes, that there is now no confiftent fcheme of Deifm in the world. Evidence on Nat. and Rev. Religion, p. 12, 27.

The firft Deiftical writer of any that appeared in this country, was Herbert, baron of Cherbury. He lived and wrote in the 17th century. His book "De Veritate" was firft publifhed at Paris in 1624. This together with his book "De Caufis Errorum," and his Treatife "De Religione Laici," were afterwardes publifhed in London. His celebrated work "De Religione Gentilium," was publifhed at Amfterdam in 1663, in 4to, and in 1700 in 8vo. and an Englifh tranflation of it was publifhed at London in 1705.

As he was one of the firft that formed Deifm into a fyftem, and afferted the fufficiency, univerfality, and abfolute perfection of natural religion, with a view to difcard all extraordinary revelation, as ufelefs and needlefs, we fhall fubjoin the five fundamental articles of this univerfal religion. They are thefe: 1. That there is one fupreme God. 2. That he is chiefly to be worfhipped. 3. That piety and virtue are the principal part of his worfhip. 4. That we muft repent of our fins; and if we do fo, God will pardon them. 5. That there are rewards for good men, and punifhments for bad men, both here and hereafter. Our own and the preceding age has produced a number of advocates in the fame caufe; and however they may have differed among themfelves, they have been agreed in their attempts of invalidating the evidence and authority of divine revelation. We might mention Hobbes, Blount, Toland, Collins, Woolfton, Tindal, Morgan, Chubb, lord Bolingbroke, Hume, &c. Some have alfo added lord Shaftefbury to the number.

But the friends of Chriftianity have no reafon to regret the free and unreferved difcuffion which their religion has undergone. Objections have been ftated and urged in their full force, and as fully anfwered; argument and raillery have been repelled; and the controverfy between Chriftians and Deifts has called forth a great number of excellent writers, who have illuftrated both the doctrines and evidence of Chriftianity in a manner that will ever reflect honour on their names, and be of lafting fervice to the caufe of genuine religion, and the beft interefts of mankind.

The number of Deifts is faid to be daily increafing: in England many men of fpeculation and letters are faid to incline that way; and the like is obferved in fome of our neighbour nations, where freedom of fpeaking, writing, and thinking, is indulged. Not that unreftrained liberty in this refpect can ever injure Chriftianity, or ferve the caufe of Deifm: truth neither needs nor feeks difguife; but where freedom is allowed, men's fentiments, on the fubject of religion, are more generally known.

DEITY, GODHEAD, a common appellation given to God; and alfo by the poets to the heathen gods and goddeffes.

DEIVIRILE, a term in the fchool theology, fignifying fomething divine and human at the fame time. See THEANDRIC.

The word is a compound of *Deus*, God, and *virilis*, of *vir*, man.

DEIZABAD, in *Geography* a town of Perfia in the province of Irak; 90 miles N. of Ifpahan.

DELAGOA BAY, a bay on the eaft coaft of Africa, fituated in S. lat. 26°, E. long. 32°; and frequently vifited by veffels employed in the fouthern whale fifhery. One of the chief rivers which enters the bay is the Mafumo; and the natives on the northern and fouthern banks follow diftinct cuftoms, the men on the former wearing fingular helmets of ftraw. On the fouthern fide are 14 chiefs, fubject to a king called Capellah, whofe dominions extend about 200 miles inland, and about 100 on the fea-fhore, computed by the natives in days' journies of 20 miles each. Cattle and poultry are abundant, and may be purchafed at a very cheap rate; the favourite articles being blue linens, old cloaths, brafs rings, copper wire, large glafs beads, tobacco, pipes, &c.; the fifh are numerous and excellent; and turtle is taken in

Deer iſland. The ſoil is a rich black mould, ſown with rice or maize in December or January; the dry ſeaſon laſting from April till October. There are many fruit-trees and uſeful plants, particularly the ſugar-cane; but no horſes, aſſes, nor buffaloes. The wild animals are the tiger, (panther), rhinoceros, antelope, hare, rabbit, wild hog, with Guinea hens, partridges, quails, wild geeſe, ducks, and ſome ſmall ſinging birds. The natives are Kuffees, that is, pagans, of a bright black colour, tall and ſtout, who go nearly naked, and are tattooed. They are good-humoured and harmleſs, and fond of excurſions on the river; there being what is called a king of the water, only yielding in power to Capellah. Like the reſt of Africa, the country is not populous; and Mr. White in his "Journal of a Voyage from Madras," 1800, 4to. ſuppoſes, that the inhabitants around this large bay may be from ſix to ten thouſand.

DE LA FOND, in *Biography*, a ſhallow conceited author of a treatiſe on muſic, publiſhed in 1725, octavo, under the title of "A new Syſtem of Muſic," in which he pretended to entirely new invent the art, furniſh it with new technica, and ſhorten its ſtudy three-fourths of the time uſually beſtowed on it, and alſo to teach a new and eaſier method than any yet known of figuring and playing thorough baſe, or, as he affectedly calls it, compound baſe.

DELAIRE, one of the claimants to the formula of accompanying the muſical ſcale of eight notes aſcending, and eight deſcending, commonly called by the French, *La regle de l'octave*, which ſee.

DELAKUS, in *Geography*, a ſmall town of Abyſſinia, ſituated on the top of a hill near the river Nile, W. of the lake of Dembea, in N. lat. 11° 44′. E. long. 37° 2′. It extends from N. E. to N. N. E. and is more conſiderable in appearance than the generality of the ſmall towns or villages in Abyſſinia, becauſe it is inhabited by Mahometans only, a trading, frugal, intelligent, and induſtrious people. It gives name to a ford of the river, which is paſſable from the end of October to the middle of May.

DE LA MARCH, a weſtern water of Illinois river, in the N. W. territory of America; 30 yards wide, and navigable eight or nine miles.

DELAMATTENOOS, an Indian tribe, in alliance with the Delawares.

DELANY, Patrick, in *Biography*, a clergyman of conſiderable celebrity in Ireland, was born about the year 1686. It is not known where or under whom he received the early part of his education; but he finiſhed his ſtudies at Trinity college, Dublin. Here he became diſtinguiſhed for learning, and was elected fellow of his college. He obtained numerous pupils, and by their progreſs Mr Delany gained a high reputation. He was the friend and aſſociate of Dr. Swift, and joined him and Dr. Sheridan in a variety of poetical effuſions, in which, however, he indulged only in the hours of relaxation from his ſtudies. He cultivated the talents of a preacher, and became very popular. About the year 1724 he was involved in a diſpute with the provoſt of the college, and was obliged ſo far to ſubmit himſelf as to acknowledge he had acted with impropriety. This offence created him other enemies, and prevented him from riſing in the church. His political principles, alſo, as a tory were obſtacles to any important preferment. About the year 1727 Delany, who had already taken his degree as Dr., was preſented, by the univerſity of Dublin, to a ſmall living worth about 100*l. per ann.:* and alſo was appointed chancellor of Chriſt-church, which produced a ſimilar income. He was afterwards appointed prebend of St. Patrick's cathedral; but he had previouſly relinquiſhed the advantages and emoluments ariſing from his fellowſhip, ſo that his income was ſtill very limited. In 1729 he commenced the publication of a periodical paper, called "The Tribune," which was a work of merit, but not ſufficiently adapted to the taſte of the public to become popular or long-lived. In 1731 Dr. Delany came to London with introductory letters to Dr. Gibſon, biſhop of London: he ſubmitted to his lordſhip's judgment a theological work, entitled "Revelation examined with Candour," &c. This he afterwards publiſhed, with the approbation of the worthy prelate. It was ſo highly eſteemed at the time that it ſoon paſſed through three editions. It conſiſts of a variety of diſſertations on ſubjects, deemed at that period of conſiderable importance, but which have ſince, or at leaſt many of them, been very little attended to. During our author's abſence from Dublin he married an Iriſh widow lady of conſiderable fortune, by which he was enabled to indulge his natural generoſity, and to live in a ſtyle of hoſpitality, to which his former narrow means were wholly unequal. This fortune, however, in after-life, was the occaſion of much trouble, and expenſive law and chancery ſuits, which, though they terminated in favour of the doctor's fortune and fame, which had been virulently attacked, muſt for ſeveral years have been the ſource of great uneaſineſs. In the Biographia Britannica is a long and intereſting account of the diſpute drawn from authentic legal ſources. In 1738 Dr. Delany gave to the world one of the beſt, if not the very beſt, of his productions; it was entitled "Reflections upon Polygamy, and the Encouragement given to that Practice in the Old Teſtament." The object of the author was to point out the diſorders and miſchiefs which the practice of polygamy muſt introduce into ſociety: the arguments have generally been admitted to be ſtrong, and his reaſoning very concluſive. There have, however, we apprehend, been very few in this country, at any times, who have been advocates for the contrary opinion, and therefore the ſubject was of leſs practical importance than was ſuppoſed by the doctor and his adherents. Dr. Delany's next publication was "An hiſtorical Account of the Life and Reign of David, King of Iſrael," which, by the candid and judicious, was conſidered as too much of an eulogy on a character, which, in ſome reſpects, is expoſed to the ſeverity of animadverſion. (See David.) Dr. Delany, having loſt his wife, married a ſecond time a lady of great taſte and ſkill in painting, and other ingenious arts. To this lady Dr. Kippis has devoted a ſeparate article; we may therefore in this place obſerve that Mrs. Delany excelled in embroidery and ſhell-work, and at the age of 74 ſhe invented a new and beautiful mode of exerciſing her ingenuity by the conſtruction of a Flora of a moſt ſingular kind, formed by applying coloured papers together. It conſiſted of nearly 1000 plants executed with unparalleled preciſion and truth. In the year 1744 Dr. Delany publiſhed a volume of "Sermons on the ſocial Duties;" and in another edition were added "Sermons on the oppoſite Vices." In the ſame year he was preſented with the deanery of Down, chiefly through the recommendation of the whigs, who had formerly ſet themſelves againſt his promotion in the church. In 1754 he publiſhed "Obſervations upon Lord Orrery's Remarks on the Life and Writings of Dr. Jonathan Swift, contaning ſeveral ſingular Anecdotes relating to the Character and Conduct of that great Genius, and the moſt deſervedly celebrated Stella." The chief object of this work was to vindicate the dean from ſome miſrepreſentations contained in the noble lord's remarks, in which the doctor has been very ſucceſsful: he has alſo afforded a clearer view of the real character of Dr. Swift than had been given in any other publication. Our author alſo publiſhed another volume of ſermons, of which thoſe on practical ſubjects, are of real and ſterling merit. In 1763 he publiſhed the third volume of his "Revelation examined with Candour;" and in 1766 another

another volume of difcourfes and differtations made their appearance. This was the laft work publifhed by Dr. Delany: we have not, however, enumerated all his publications; many fingle fermons and fmall tracts do not appear to command feparate notice. The doctor died at Bath, in the month of May 1768. in the 83d year of his age. As a writer he poffeffed refpectable talents, which he exercifed in the caufe of virtue and true religion. His piety and benevolence were confpicuous; but the warmth of his temper was fometimes accompanied with a certain portion of irritability and impetuofity. Few excelled him in charity, and hofpitality. His income which, during the laft twenty years of his life, was 3000*l. per ann.*, funk under the exercife of thefe virtues, and he left little behind him but his books and furniture. He is faid to have been a very abfent man, in proof of which the following anecdote, among others, has been told of him. Being at his own defire appointed to preach before the king, and not knowing the ufual etiquette of the bufinefs, he entered the royal chapel after fervice was commenced; not knowing the place appropriated to the preacher, he crouded into the defk by the reader. The vefturer in the midft of his devotions went and pulled him by the fleeve, but the doctor chagrined at being interrupted during the folemnity of prayer, refifted the intruder, who in vain begged him to come out; and faid, "There was no text:" the doctor faid he had a text, and it was fome time before he could be brought to underftand that the text muft be written out for the clofets. Biog. Brit.

DELARAM, in *Geography*, a town of Perfia, in the province of Segiftan; 90 miles N. E. of Zareng.

DELAS, a river of Wales, in the county of Brecknock, which runs into the Yrvon, five miles S. W. of Bealth.

Delas, or *Silla, Diala*, in *Ancient Geography*, a river of Afia, in Perfia, to the left of the Tigris, into which it difcharges itfelf, after having watered the towns of Apollonia, Aftargeda, &c. in flowing from its fource in mount Zagrus.

DE LA WAR, a town of America, in the ftate of Virginia, and King William's county, fituated on the broad peninfula formed by the confluence of the Pamunky and Mattapony. The united ftream here affumes the name of York-river. The town lies 20 miles N. by W. of Williamfburg.

DELAWARE, one of the United States of N. America, fituated between 38° 29′ 30″, and 39° 54′ N. latitude, and between 75° and 75° 48′ W. long., being 92 miles in length and 24 miles in breadth, and containing 2000 fquare miles, or 1,200,000 acres. This ftate is bounded E. by the river and bay of the fame name, and the Atlantic ocean; on the S. by a line from Fenewick's ifland, in N. lat. 38° 29′ 30″, drawn weft till it interfects what is commonly called the *tangent* line, dividing it from the ftate of Maryland; on the W. by the faid tangent line, paffing northward up the peninfula, till it touches the weftern part of the territorial circle; and thence on the N. by the faid circle, defcribed with a radius of 12 miles about the town of Newcaftle, which divides this ftate from Pennfylvania. It derived its name from Lord De La War, who was inftrumental in eftablifhing the firft fettlement of Virginia. The Delaware ftate is divided into three counties, viz. Newcaftle, Kent, and Suffex, whofe chief towns are Wilmington, Newcaftle, Dover, and Lewes. Dover is the feat of government. The number of inhabitants is 64,273, of whom 6153 are flaves. The eaftern fide of the ftate is indented with numerous creeks, or rivers, which generally have a fhort courfe, foft banks, many fhoals, and are fkirted with very extenfive marfhes. In the fouthern and weftern parts of this ftate, fpring the head-waters of Pocomoke, Wicomico, Nanticoke, Choptank, Chefter, Saffafras, and Bohemia rivers, all of which fall into Chefapeak bay, and fome are navigable for 20 or 30 miles into the country by veffels of 50 or 60 tons. Excepting the upper part of the county of Newcaftle, this ftate is, generally fpeaking, low and level. It abounds at particular feafons of the year with ftagnant water, which renders it unfit for the purpofes of agriculture, and injurious to the health of its inhabitants. The fpine, or higheft ridge of the peninfula, runs through the ftate of Delaware, inclining to the eaftern or Delaware fide. It is defignated in Suffex, Kent, and part of Newcaftle, counties by a remarkable chain of fwamps, from which the waters defcend on each fide, paffing on the E. to the Delaware, and on the W. to the Chefapeak. Notwithftanding the fwamps already mentioned, Delaware is an agricultural ftate; including a fertile tract of country, which yields a variety of ufeful productions. Along the Delaware, and from eight or ten miles into the interior country, the foil is generally a rich clay. Thence to the fwamps above mentioned, it is light, fandy, and of an inferior quality. About Chriftiana the heights are lofty; fome of the hills of Brandywine are rough and ftony; but with thefe and fome few other exceptions, the lower country forms almoft one extended plain. In the county of Newcaftle the foil is a ftrong clay; in Kent it has a confiderable mixture of fand; and in Suffex the fand predominates. Wheat of the beft quality is cultivated in this ftate, and it is much valued and fought for, not only through the States of the Union, but in foreign markets. Befides wheat, which yields the beft fuperfine flower, this ftate generally produces plentiful crops of Indian corn, barley, rye, oats, flax, buckwheat, and potatoes, and various kinds of fruit in great perfection. It abounds in natural and artificial meadows containing a large variety of graffes. Hemp, cotton, and filk, duly attended, would, without doubt, flourifh here very well. The county of Suffex has excellent grazing lands. From hence are alfo exported large quantities of lumber, obtained chiefly from an extenfive fwamp, called the Indian river or Cyprefs fwamp, lying partly in this ftate, and partly in the ftate of Maryland. This morafs extends fix miles from E. to W., and nearly twelve from N. to S., including an area of nearly 50,000 acres of land. It contains a great variety of plants, trees, wild beafts, birds, and reptiles. Almoft the whole of the foreign exports of Delaware are from Wilmington; the trade from this ftate to Philadelphia is very confiderable, being the principal fource whence that city draws its ftaple commodity. No lefs than 265,000 barrels of flour, 300,000 bufhels of wheat, 170,000 bufhels of Indian corn, befide barley, oats, flax-feed, paper, flit iron, fnuff, falted provifions, &c. &c. to a very confiderable amount, are annually fent from the waters of the Delaware ftate; of which the Chriftiana is much the moft productive, and probably much more fo than any other creek or river of like magnitude in the Union; 245,000 barrels of flour, and other articles to the amount of 80,000 dollars, or more, being exported from this creek; of which to the value of 550,000 dollars are manufactured on its northern bank, within two or three miles of the navigation. Among other branches of induftry exercifed in or near Wilmington, are a cotton manufactory, and a bolting-cloth manufactory, both of which promife to be of lafting benefit to the country. In the county of Newcaftle are feveral fulling mills, two fnuff mills, a flitting mill, four paper mills, and 60 mills for grinding grain, all of which are turned by water; and this neighbourhood admits ftill of greater improvements. The legiflature in the January feffion 1796 paffed an act to create a fund for the eftablifhment of fchools throughout the ftate. The manufacture of flour is carried unto great perfection in this

 ftate;

ftate; numerous mills are erected for this purpofe; and thofe of Brandywine ftream, three miles from the creek on which they ftand, half a mile from Wilmington, and 27 from Philadelphia, are moft extolled, as capable of grinding annually 400 000 bufhels, though, from collateral circumftances, their ufual yearly produce does not amount to more than from 290 to 300,000 bufhels. Thefe mills employ about 200 perfons; and they are fo conveniently fituated with regard to navigation, that a veffel carrying 1000 bufhels of wheat may be laid along-fide any of thefe mills, and the water adjoining fome of them is fufficiently deep to admit veffels of twice the above fize. By means of well contrived machinery the veffels are loaded and unloaded with furprizing expedition. Befides wheat and flour, this ftate exports lumber, and various other articles. The amount of exports for the year ending September 30, 1791, was 119,878 dollars 93 cents; in 1792, 133,972 dollars 27 cents.; in 1794, 207,985 dollars 33 cents.; and in 1801, 440,504 dollars.

In the ftate of Delaware, there is a variety of religious denominations; of Prefbyterians there are 24 churches; of Epifcopalians, 14; of Baptifts, 7; and of Methodifts, a confiderable number, particularly in the two lower counties of Kent and Suffex. At Wilmington there is a Swedifh church, one of the oldeft in the United States.

Of minerals there are few in this ftate, except iron. Wheat and lumber are its ftaple commodities. We have already mentioned feveral other articles of its produce and manufacture.

Settlements were made in Delaware by the Dutch about the year 1623, and by the Swedes about the year 1627. Their fettlements were comprehended in the grant to the duke of York; and William Penn united them to his government by purchafe. They were afterwards feparated, in fome meafure, from Pennfylvania, and denominated, the "Three Lower Counties." They had their own affemblies; but the governor of Pennfylvania ufed to attend, as he did in his own proper government. At the late revolution, the three counties were erected into a fovereign ftate, and have eftablifhed a republican conftitution. Morfe.

Delaware *County*, a county of Pennfylvania, S.W. of Philadelphia county, on the Delaware river; about 21 miles long, and 15 broad, containing 115,200 acres, and fubdivided into 21 townfhips, the chief of which is Chefter. The number of inhabitants is 12,809. The lands bordering on the Delaware are low, and afford excellent meadow and pafturage; and are guarded from inundations by mounds of earth or dykes, which are fometimes broken down by extraordinary frefhes in the river, to the great damage and fubfequent expence of the proprietors. Great numbers of cattle are brought hither from the weftern parts of Virginia, and N. Carolina, to be fattened for fupplying the Philadelphia market.

Delaware, a county in New-York, on the head-waters of Delaware river, containing 21,700 inhabitants.

Delaware, a townfhip in Wayne county, Pennfylvania, including 381 inhabitants.

Delaware *Bay* and *River*. The bay is 60 miles long, from the cape to the entrance of the river, at Bombay Hook; occupies a fpace of about 630,000 acres; and is in fome parts fo wide, that a fhip, in the middle of it, cannot be feen from the land. It opens into the Atlantic N.W. and S.E. between cape Henlopen on the right, and cape May on the left. Thefe capes are 18 or 20 miles apart. Delaware river was called Chihohocki by the aboriginals, and in an old Nuremberg map is named Zuydt river. It rifes by two principal branches in the ftate of New York; the northernmoft of which, called the Mohawk's or Cookquago branch, rifes in lake Utfayanthe, lat. 42° 25′, and takes a S.W. courfe, and turning fouth-eafterly, croffes the Pennfylvania line in lat. 42°; and about 7 miles from thence, it receives the Popachton branch from the N.E., which rifes in the Kaat's-Kill mountains. Thence it runs fouthwardly, until it touches the N.W. corner of New Jerfey, in lat. 41° 24′; and then paffes off to fea through Delaware bay; having N. Jerfey E. and Pennfylvania and Delaware W. The bay and river are navigable from the fea to the great or lower falls at Trenton, 155 miles; and are accommodated with buoys and piers for the direction and fafety of fhips. A 74 gun fhip may go up to Philadelphia, 120 miles by the fhip channel from the fea. The diftance acrofs the land, in a S.E. courfe to N. Jerfey coaft, is but 60 miles. Sloops go 35 miles above Philadelphia to Trenton falls; boats, that carry 8 or 9 tons, 100 miles farther; and Indian canoes 150 miles, except feveral fmall falls or portages. It is in contemplation to connect the waters of Chefapeak bay with thofe of Delaware river by 4 different canals, *viz.* Elk river with Chriftiana creek; Broad creek, another branch, with Red-lion creek; Bohemia, a third branch of the Elk, with Apoquinemy creek; and Chefter river with Duck creek. Morfe.

Delaware, a fmall river of Eaft Florida.

Delaware, a townfhip in the county of Suffolk, Upper Canada, lying on the E. fide of the river Thames, in the plains above the Delaware village of Indians.

DELAWARES, an Indian nation, formerly numerous and powerful, who poffeffed part of Pennfylvania, New Jerfey, and New York. This name was given them by the Europeans; for they call themfelves Lennilenape, that is, Indian men; or Woapannackky, which fignifies, a people living towards the rifing fun. They now refide about half-way between lake Erie and Ohio river. They are an ingenious and intelligent people; and, like the Six Nations, are celebrated for their courage, peaceable difpofition, and powerful alliances. Almoft all the neighbouring nations are in league with them, efpecially the Mahikun, Shawanees, Cherokees, Twichtwees, Wawiachtanos, Kickapees, Mofhkos, Tuckachfhas, Chippeways, Ottawas, Putiwoatamies, and Kafkakias. The Delawares, who were hoftile, made peace with the United States in 1795, and ceded fome lands. The United States, on their part, have engaged to pay them in goods to the value of 1000 dollars a year for ever. Formerly the Delawares could furnifh 600 warriors; but their number has been lately confiderably decreafed by war. Morfe.

DELBRUCK, a fmall town of the kingdom of Weftphalia. It formerly belonged to the bifhopric of Paderborn; and is fituated 12 miles W. of Paderborn.

DEL credere, *Commiffion of*, in *Commerce*, an undertaking by an infurance-broker, for an additional premium, to infure his principal againft the contingency of the failure of the under-writer. 1 Term Rep. 112.

DELDEN, in *Geography*, a fmall town of the kingdom of Holland, in the department of Overyffel.

DELEBIO, a fmall town of the canton of the Grifons, in the Helvetic republic, fituated in the Veltlin, in the Squadra de Morbegno, near the caftle of Fuentes, remarkable for the abbey of Aqua Fredda, and a chapel built on the field where Philip Maria, duke of Milan, defeated the Venetians in 1434. Dictionnaire de la Suiffe.

DELECITO, a town of Naples, in the province of Capitanata; 10 miles S.S.E. of Troja.

DELEGATES, certain perfons delegated, or appointed by the king's commiffion, under the great feal, to fit upon an

an appeal to the king in the court of chancery. See COURT *of Delegates*.

For delegates in academical caufes; fee *Univerfity* COURT.

DELEGATION, a commiffion extraordinary given a judge to take cognizance of and determine fome caufe, which ordinarily does not come before him.

In the civil law, delegation alfo denotes a fort of furrender, whereby a perfon fubftitutes another debtor in his place. See Ulpian, l. 11. ff. *de novationibus & delegationibus*.

This delegation differs from transferring, or tranflation, becaufe three perfons intervene in a delegation, *viz.* the creditor, the debtor, and a third, who himfelf is indebted to the debtor, and on whom the debtor transfers the obligation he was under to pay the creditor, delegating him, as it were, for that purpofe. But, in a fimple transfer, it is enough the transferrer and the transferree be prefent.

DE'LE'MONT, or DELSBERG, and *Delfperg*, in *Geography*, a fmall town of France, in the department of the Upper Rhine, chief place of a diftrict of the fame name, fituated on the river Byrfe, with a population of 904 individuals. It has a fubprefect, a court of juftice, and a regifter office. Its canton has an extent of 307½ kiliometres, 32 communes, and 10,118 inhabitants. The whole diftrict comprizes 5 cantons, 107 communes, 35,779 inhabitants, and a territorial extent of 920 kiliometres. The country is mountainous, and produces very little.

Till the year 1793 Délémont belonged to the bifhopric of Bafle. The prince bifhop had a palace here, and the canons of Moutiers fome very elegant houfes. Near Délémont are fine quarries of white free-ftone, refembling marble, a mineral fpring, and other natural curiofities, but chiefly petrifications. Herbin Statiftique de la France. Dictionnaire de la Suiffe.

DELETERIOUS (from δηλεω, *noceo, I hurt)*, a term fometimes ufed among naturalifts for fuch things as are of a pernicious and poifonous nature. See POISON.

DELF, a quarry, or mine, where ftone or coal is dug. From the Saxon word *delfan*, to delve or dig.

DELF *of Coal*, denotes coal lying in veins under ground, before it is dug up.

DELF, or *Delve of Coals*, is alfo a certain quantity, dug out of a mine or pit. See COAL.

DELF is alfo ufed in *Heraldry* for one of the abatements of honour; being a fquare in the middle of the efcutcheon.

A delf tenne was anciently due to him who receded from his own challenge, or any way departed from his parole, or word. If there be two or more delfs in an efcutcheon, it is then no longer an abatement: fo alfo, if it be of metal, or charged upon; it then becomes a charge of perfect bearing.

DELF, or *Delft-ware*, Fr. *Fayence*, a kind of pottery of baked earth, covered with an enamel, or white glazing, which gives it the appearance and neatnefs of porcelain. The bafis of this pottery is clay; and the kinds of clay chiefly ufed are the blue and green, with an addition of marle or fand, in order to leffen the contraction of the clay, to render it lefs compact, and to afford a better ground for the enamel. Red clay is alfo added, which, on account of its ferruginous matter, binds and gives a greater folidity. The proportions of thefe ingredients vary in different works, according to the different qualities of the earths employed. Three parts of blue clay, two of red clay, and five parts of marle, form the compofition ufed in feveral manufactories. Veffels formed of thefe materials muft be dried very gently, to avoid cracking. They are then to be placed in a furnace to receive a flight baking, and they are laftly to be covered with an enamel or glazing, which is done by putting upon the veffels thus prepared, the enamel, which has been ground very fine, and diluted with water. The glazing, which is nothing but white enamel, ought to be fo opake as not to fhew the ware under it. The enamels for delf-ware are compofed of fand or flints, vitrifying falts, calx of lead, and calx of tin. The vitrification of fand is effected by fomewhat lefs than an equal part of alkaline falt, or twice its weight of calx of lead, and one part of calx of tin, which is defigned for giving a white opake colour to the mafs, is to be added to three or four parts of all the other ingredients taken together. M. D'Antic recommends for the white enamel, ufed in glazing, a mixture of a hundred pounds of calx of lead, with about a feventh part of that quantity of calx of tin, for common delf, or a fourth part of calx of tin for the fineft delf; a hundred, or a hundred and ten pounds of fine fand; and about twenty or thirty pounds of fea-falt or falt of glafs. To make this enamel, lead and tin are calcined together with a ftrong fire, or the fand is alfo to be made into a frit with the falt or afhes. The whole, being well mixed and ground together, is placed under the furnace, where it is melted and vitrified during the baking of the ware. Then it is to be ground in a mill, and applied as above directed. Dict. of Chem. Eng. edit. 1777. See ENAMEL, GLAZING, and PORCELAIN.

DELFACE, FRANCIS, in *Biography*, a learned French monk, was born at Montet in Auvergne, in the year 1637. He entered upon the monaftic life at Clermont, in 1656, where he recommended himfelf to the notice and refpect of his fuperiors, as well by his fteady application, as by his talents. He was fixed on, at the inftigation of the celebrated Arnaud, to give a new edition of the works of St. Auguftine. To this work he applied himfelf with all diligence, and had made confiderable preparation for the publication, when an anonymous tract, that expofed church abufes, came out, and was imputed to him. For this he was unjuftly banifhed, having, it is believed, had no concern in the offence for which he fuffered punifhment. The place of his exile was Lower Bretagne, where he was unable to proceed on his great work. He was fhortly after his banifhment called upon to preach at Breft, on fome public occafion, when the veffel in which he took his paffage was wrecked, and he was among the number of thofe that were drowned. This happened in October 1676, in the thirty-ninth year of his age. He was author of feveral works which are not interefting to the Englifh reader. His hiftorical eulogy, entitled, "The Epitaph of Cafimir, King of Poland, who, after having abdicated his Crown, retired into France, and became Abbot of St. Germain de Pres," is a work of confiderable merit. Moreri.

DELFINO, in *Geography*, a town of European Turkey, and capital of Lower Albania, where the pacha refides; 356 miles W. of Conftantinople, and 60 S.S.W. of Edeffa. N. lat. 40° 4'. E. long. 21° 15'.

DELFT, or VAN DELPHUS, WILLIAM JAMES, in *Biography*, an excellent painter and engraver, was the fon of William Delft, and a near relation (grandfon, according to Pilkington) of Michael Miravelt, and born at Delft in 1619. He drew and painted portraits with excellent tafte; and having been inftructed by Miravelt, acquired a fimilar mode of defign and colouring, and fuccefsfully imitated him in the management of his pencil, fo that he is faid to have equalled Miravelt in force and delicacy. However, he is more generally known as an engraver; and his beft prints are highly finifhed: fome of them are executed in a bold, powerful, open ftyle, which produces a fine effect. Such was

was his portrait of Hugo Grotius, dated 1652; and others in a neat and much more finifhed manner, as we find, fays Strutt, in the admirable portrait of Michael Miravelt, from a picture of Vandyck. He ufually figned his name at length, and fometimes fubftituted the letters G. V. D., or a cypher compofed of a G and a D. It does not appear that he was ever in England; and yet he engraved feveral Englifh portraits, as Charles I. of England, Henrietta Maria, his queen, George Villars, duke of Buckingham, &c. and ftyles himfelf the king's engraver. He died in 1661. Pilkington and Strutt.

DELFT, in Latin *Delphi*, in *Geography*, a confiderable and handfome town of the kingdom of Holland, in the department of the Maefe, or Meufe, on the river Schie between Rotterdam and Leyden, 4 miles S. of the Hague, 6 miles N.W. of Rotterdam, and 9 miles S. of Leyden. N. lat. 51° 53′. It has 25,000 inhabitants, is nearly two miles in circumference, and defended againft inundations by three dams or dikes. The principal ftreets have fpacious canals planted on each fide with trees. The public buildings, particularly the town-houfe or guild-hall, are very magnificent. The arfenal, before the late revolutions, was confidered as one of the beft furnifhed in Holland. In the principal church is the noble tomb of prince William I. of Orange, founder of the former Batavian republic, who was bafely affaffinated in 1584; and in another church a marble monument erected to the memory of admiral Tromp.

Delft owes its origin to Godfrey the Hunchback, duke of Lower Lorraine, who built a caftle here in 1071, but it is chiefly remarkable for its manufacture of earthen ware, or pottery, made of baked earth covered with an enamel or white glazing which gives it the appearance and neatnefs of porcelain. This earthen ware is known in commerce by the name of *Delft ware*.

DELFTLAND, was formerly that portion or diftrict of the department of the Maefe, in Holland, in which the towns of Delft and Delftfhaven are fituated.

DELFTSHAVEN, or the port of Delft, a fmall neat town of the kingdom of Holland, in the department of the Maefe, on the mouth of the river Maefe, 6 miles S. by E. of Delft, with which it is connected by a handfome canal. It is in fact the harbour of Delft.

DELFZYL, a fmall town of the kingdom of Holland, in the department of Groeningen, with a caftle near the mouth of the river Eems at its confluence with the Fivel, or Damfter Diep, 3 miles N. of Dam, 18 miles N.E. of Groeningen, and 12 S.W. of Emden. N. lat. 53°. 18′. E. long. 6° 20′.

DELGADO, CAPE, a cape on the eaft coaft of Africa, in the Indian fea. S. lat. 10° 5′. E. long. 40°.—Alfo, a cape on the eaft coaft of Africa, in the Indian fea. N. lat. 9° 45′. E. long. 50°. 15′.

DELGOVITIA, in *Ancient Geography*, a place of Britain, marked in Antoninus's Itinerary, iter 1., 20 miles from York, belonging to the Brigantes. This ftation is generally placed by antiquarians at Wighton, or at Godmanham, a village about half a mile from it.

DELHI, or DEHLI, one of the eleven foubahs, or provinces, into which Acbar, during his long reign in the 11th century, divided Hindooftan Proper; to which four more were afterwards added. It was formerly a kingdom or empire of confiderable extent, containing feveral provinces or circars, and many cities and towns; but having been the feat of continual wars for more than 50 years, and encroached upon by numerous invaders, it is now reduced into a wretched ftate, and its boundaries have been fluctuating and precarious, as well as very limited. The country is almoft depopulated, and moft of the lands are lying wafte; the wretched inhabitants not daring to provide more than the bare means of fubfiftence, for fear of attracting the notice of thofe whofe trade is pillage. Nothing but the natural fertility of the foil, which produces wheat, rice, millet, fugar, indigo, pulfe, and fruits of various kinds, and the mildnefs of the climate, more temperate even than that of the neighbouring province of Agra, could have kept up any degree of population; and rendered the fovereignty of it, at this day, worth contending for. A tract of country, which poffeffes every advantage that can be derived from nature, contains the moft miferable of inhabitants; fuch is the dire effect of the ambition of their fuperiors, and fo dearly do mankind pay for it; who, mifcalculating their powers, think they can govern as much as they can conquer. The only territory remaining to the tribe of Timur or Tamerlane is a fmall diftrict round Delhi, together with the city itfelf (now no longer a capital), expofed to repeated depredations, maffacres, and famines, by the contefts of invaders. The province has now 8 circars, fubdivided into 232 pergunnahs. Its revenue is faid to be 601,615,555 dams, reckoning 320 dams equal to 1*l.* fterling. It is moftly in the poffeffion of Sindia.

DELHI, or *Dehli*, the chief town of the fore-mentioned province, was once a celebrated city, the capital of Muffulman fovereignty in Hindooftan, and in more early times, the feat of Hindoo dominion over northern India. We firft hear of it, as the capital of Hindooftan, about the year 1200; and it is faid to have been founded by Delu about 300 years before our era, and, as Mr. Rennell thinks, fhould properly be written "Dehly;" the Ayen Acbaree fays, that its ancient name (in Sanfcrit) was "Inderput," or "Indraput," the houfe of Indra. As Canouge declined, Delhi rofe in reputation; and it continued the unrivalled metropolis of Hindooftan, till the year 1398, when Timur, or Tamerlane, turned his arms towards Hindooftan; in October he croffed the Indus; and foon after his army proceeded in different divifions to Delhi, which fubmitted, without what may be properly termed a battle. On the 16th of December in the fame year, it is faid, that this mercilefs conqueror entered the city, erected the great ftandard of the Tartarian empire immediately on its walls; and the ufurper, feated on the throne of India, in all the pride of conqueft, received the proftrate homage of the nobility of both nations. In confequence of fome refiftance reluctantly made by the inhabitants to the wanton ravages of their conquerors, Delhi, and all the wonderful monuments of art contained in it, were devoted to be pillaged; and on the 13th of January, this great city was deftroyed. Delhi, however, recovered part of its former fplendour under the dynafty of fuceeding kings, and was ftill confidered as the imperial city of Hindooftan until the reign of Acbar, or Akbar, who, commencing his reign in 1556, and fixing his refidence at Agra, where he died in 1605, completed the ruin which time and neglect had united to fpread through the wide circumference, and amid the defolated towns of Delhi. In 1647, Shah-Jehan, grandfon of Acbar, removed the feat of his empire from Agra to Delhi, calling it "Shahjehanabad," or "Jehanabad;" where on the banks of the river Chun he built a noble caftle and palace, with gardens and other conveniences, which coft above 50 lacks of rupees, or 625,000*l.* At this time the yearly revenue of Delhi amounted to 100 krores of dams, or (reckoning each dam at the 40th part of a rupee, and the rupee as 2*s.* 6*d.* fterling) 3,125,000*l.* Aurungzebe, the third fon of Shah-Jehan, took poffeffion of the throne in 1659; and during his reign the revenues of the province of Delhi amounted to 1,221,950,137 dams. Delhi continued

continued to increafe in fplendour and importance, until it was entered in 1738-9 by Nadir Shah, the ufurper of the Perfian throne, who demanded 30 millions fterling, by way of ranfom. Tumults, maffacres, and famine were the refult; 100,000 of the inhabitants were flaughtered, and 62 millions of plunder were faid to be collected. It was again plundered and depopulated by Ahmed Abdalla in 1756, 1759, and 1760; although during the time of Aurungzebe, it was fuppofed to contain two millions of fouls. Abdalla on this occafion became emperor of Delhi; and if his inclinations had led him to eftablifh himfelf in Hindooftan, it is probable that he might have begun a new dynafty of emperors in his own perfon. Shah-Aulum, the lineal defcendant of the houfe of Timur, afpired to poffefs the capital city of his anceftors, and with this view put himfelf into the hands of the Mahrattas, who promifed to feat him on the throne of Delhi. Thus deluded, he left Allahabad, where he refided under the protection of the Englifh, to whom he owed all that he poffeffed, and went to Delhi, where he remained a kind of ftate-prifoner. The private diftreffes of this prince, for it would be almoft mockery to call him the great Mogul, or emperor, were fo great, that in 1784 his fon was deputed to folicit affiftance from the Englifh. Since the peace of 1782, Madajee Sindia, a Mahratta chief, and the poffeffor of the principal part of Malwa, has taken the lead at Delhi, and taken poffeffion of feveral places, with a view to extend his conquefts on the fide of Agimere, and to eftablifh a confiderable ftate or kingdom.

Delhi is not fo well built as Agra. It is not eafy to afcertain its extent, which was faid to contain, as we have above mentioned, two millions of inhabitants. Bernier, a refpectable and credible writer, who penned his account in 1663, only four years after the acceffion of Aurungzebe, does not warrant fo high a calculation of its inhabitants; and it is well known that, under his reign, both the empire and capital were greatly augmented. Bernier eftimated the circumference of Delhi at 3 leagues only, reckoning what was within the fortifications, befides which he defcribes feveral fuburbs, but altogether, no extraordinary extent for a capital city in India. He defcribes Agra as being confiderably larger. After the plunders and maffacres which it has undergone, fince the decline and downfall of the Mogul empire, it muft be fuppofed to have been reduced very low; and accordingly, it is fpoken of by late travellers as a city of moderate extent; and even for an Indian city, very ill built. Claud Boudier found the latitude of Delhi to be 28° 37′, and its longitude 77° 40′. The account from which we fhall make the following extracts is the lateft we have feen, and we have no reafon to queftion its accuracy. It is extracted from a journal of obfervations made during an official tour through the Dowab and the adjacent diftricts, by lieutenant W. Franklin, in company with captain Reynolds of the Bombay eftablifhment, appointed by the Bengal government to furvey that part of the country in the year 1793. (Afiatic Refearches, vol. iv. p. 417, &c.) The extent of the ruins of old Delhi cannot, as this writer fuppofes, be lefs than a circumference of 20 miles. The environs to the N.W. are crowded with the remains of fpacious gardens and country-houfes of the nobility, which were formerly fupplied with abundance of water by means of the noble canal dug by Ali Mirdan Khan, and which formerly extended from above Paniput quite down to Delhi, where it joined the Jumna; fertilizing in its courfe a tract of more than 90 miles in length, and beftowing affluence on thofe who lived within its extent. The new city of Shah-Jehanabad, built by Shah-Jehan, A.D. 1631-2, lies on the weftern bank of the Jumna, in N. lat. 28° 36′. The city is about 7 miles in circumference and is furrounded on three fides by a wall of brick and ftone; a parapet runs along the whole, with loop-holes for mufquetry; but no cannon are planted on the ramparts. The city has 7 gates, *viz.* Lahore-gate, Ajmere-gate, Turkoman-gate, Delhi-gate, Moor-gate, Cabul-gate, and Cafhmere-gate; all of which are built of ftone, and have handfome arched entrances of ftone, where the guards of the city keep watch. Near the Ajmere gate is a "Madriffa," or college, erected by the nephew of Nizam-ul-Moolluch; it is built of red ftone, and fituated at the centre of a fpacious quadrangle, with a ftone fountain. At the upper end of the area is a handfome mofque built of red ftone, inlaid with white marble. The apartments for the ftudents are on the fides of the fquare, divided into feparate chambers, which are fmall but commodious. The tomb of Ghazi, its founder, is in the corner of the fquare, furrounded by a fhrine of white marble, pierced with lattice-work. The college is now fhut up, and deftitute of inhabitants. In the neighbourhood of the Cabul-gate is a garden, in which are two tombs, one of the wife of the emperor Mahommed Shah, and another of the daughter of Aurungzebe. On a rifing ground near this garden, whence there is a fine view of Shah-Jehanabad, are two broken columns of brown granate, 8 feet high, and $2\frac{1}{2}$ feet broad, on which are infcriptions in an ancient character.

Within the city of New Delhi are the remains of many fplendid palaces, belonging to the great Omrahs of the empire; all of which are furrounded with high walls, and occupy a confiderable fpace of ground. Their entrances are through lofty arched gate-ways of brick and ftone, at the top of which are the galleries for mufic; before each is a fpacious court-yard for the elephants, horfes, and attendants of the vifitors. Each palace has likewife a "Mahal," or feraglio, adjoining, which is feparated from the "Dewan-Khana," by a partition-wall, and communicates by means of private paffages. All of them had gardens with capacious ftone-refervoirs, and fountains in the centre; an ample terrace extended round the whole of each palace; and within the walls were houfes and apartments for fervants and followers of every defcription, befides ftabling for horfes and other accommodations. Each palace was likewife provided with a handfome fet of baths, fome of which were furnifhed with beautiful rooms, paved and lined with white marble, and confifting of five diftinct apartments, into which light is admitted by glazed windows at the top of the domes.

Shah Jehanabad is alfo adorned with many fine mofques, feveral of which are ftill in perfect repair and beauty. One of thofe that are moft worthy of notice is the "Jama Mufjed," or great cathedral, fituated about a quarter of a mile from the royal palace, the afcent of which, as it is fituated on a rocky eminence, is by a flight of 35 ftone fteps, through a handfome gate-way of red ftone. The doors of this gate-way are covered throughout with plates of wrought brafs, imagined by Mr. Bernier to be copper. The terrace on which the mofque is fituated, is a fquare of about 1400 yards of red ftone; in the centre is a fountain lined with marble, for the purpofe of performing the neceffary ablutions previous to prayer. An arched colonnade of red ftone furrounds the whole terrace, which is adorned with octagon pavilions at convenient diftances, accommodated with feats. The mofque is of an oblong form, 261 feet long, furrounded at the top, with three magnificent domes of white marble, interfected by black ftripes, and flanked by two minarets of black marble and red ftone alternately, rifing to the height of 130 feet. Each of thefe minarets has three projecting galleries of white marble; and their fummits are crowned with light octagon pavilions of the fame. The whole front is faced with large flabs of beautiful white marble; and along the cornice are 10 compartments, 4 feet long, and $2\frac{1}{2}$ broad, inlaid

inlaid with infcriptions in black marble, in the "Nufki," character, which are faid to contain great part, if not the whole, of the Koran. The infide of the mofque is paved with flags of white marble, decorated with a black border. The walls and roof are lined with plain white marble; and the "nimber," or pulpit, is of marble, having an afcent of four fteps and ballustraded. The afcent to the minarets is by a winding ftair-cafe of 130 fteps of red ftone; and at the top is a noble and extenfive view. The domes are crowned with cullifes, richly gilt; and prefenting a glittering appearance at a diftance. This mofque was begun by Shah Jehan, in the 4th year of his reign, and completed in the tenth; the expences of its erection amounted to 10 lacks of rupees; and it is in every refpect worthy of being the grand cathedral of the empire of Hindooftan. Befides the mofque above defcribed, there are in the city and its environs above 40 others, of inferior fize and of the fame fafhion.

The modern city of Shah Jehanabad is rebuilt, and contains many good houfes, chiefly of brick. The ftreets are in general narrow; but there were formerly two very noble ftreets, one in a direction N. and S., and another lying E. and W.; the former having handfome houfes on each fide of the way, and merchants' fhops well furnifhed with the richeft articles of all kinds, and provided with water by means of an aqueduct of red ftone, conftructed by Shah Jehan. The bazars in Delhi are at prefent but indifferently furnifhed, and the population of the city has been of late years much reduced. Cotton cloths are ftill manufactured, and the inhabitants export indigo. Their chief imports are by means of the northern caravans, which arrive once a-year, and bring with them from Cabul and Cafhmere fhawls, fruit, and horfes. There is alfo a manufacture at Delhi for beedree hooka bottoms. The cultivation about the city is principally on the banks of the Jumna, where it is very good; the vicinity produces corn and rice, millet and indigo. The limes are very large and fine. Precious ftones are likewife to be had at Delhi, of very good quality; particularly the large red and black cornelians. The city is divided into 36 mohauls or quarters, each of which is named either after the particular Omrah who refided there, or from fome local circumftances relative to the place. The modern city of Shah Jehanabad appears to have been built upon two rocky eminences; the one where the "Jama Musjid" is fituated, named "Jujula Pahar," and the other the quarter of the oil-fellers, called "Bejula Pahar;" both of thefe eminences afford a commanding view of the remainder of the city. From the vaft quantity of buildings, found in the environs of Delhi for upwards of 20 miles in extent, as well as from their grandeur and ftyle of architecture, we may infer that this had once been a rich, flourifhing, and populous city. The palace of the royal family of Timur was erected by the emperor Shah Jehan, when he finifhed the new city; it is fituated on the weftern bank of the Jumna, and furrounded on three fides by a wall of red ftone. Its circumference is about a mile, and comprehends feveral public buildings, particularly two halls of audience, one called "Dewaun Aum," for people of all defcriptions, and the other, or "Dewaun Khafs," for the nobility. The latter was formerly adorned with exceffive magnificence; but it has in later times been much defpoiled by invaders. It is about 150 feet in length, by 40 in breadth, and ftill poffeffes many remains of beauty and fplendour which excite admiration. Around its interior, in the cornice, are the following lines, engraved in letters of gold upon a white marble ground; "If there be a paradife upon earth, this is it:—'tis this, 'tis this." The royal baths, built by Shah Jehan, are fituated to the northward of the Dewaun Khafs, and confift of three very large apartments furmounted by white marble domes, and admirably finifhed within. The light is admitted from the roof by windows of party-coloured glaffes. In the "Shah Baug," or royal gardens, is a very large octagon room, which looks towards the river Jumna.

The "Gentur Munter," or obfervatory, in the vicinity of Delhi, was built in the third year of the reign of Mohammed Shah, by the rajah Jeyfing, who was affifted by many perfons celebrated for their knowledge in aftronomy from Perfia, India, and Europe; it has been fince plundered by the Jeits under Juwaher Sing. The royal gardens of Shalimar, began by the emperor Shah Jehan in the 4th year of his reign, and finifhed in the thirteenth, were laid out with admirable tafte, and coft the enormous fum of a million fterling; but they have fince been laid wafte, and the greateft part of the coftly materials have been removed. Here are found among other buildings the apartments of the Haram, enclofed by high walls; fome of thefe apartments are conftructed with red ftone, and others with brick faced with fine chunam, and decorated with paintings of flowers of various patterns. All of them have winding paffages, which communicate with each other, and the adjoining gardens by private doors. The extent of the gardens is not above a mile in circumference, encompaffed by a high brick wall, deftroyed in many parts of it; and the extremities are flanked with octagon pavilions of red ftone. They ftill abound with old trees of a very large fize. The profpect to the fouthward of Shalimar towards Delhi, as far as the eye can reach, is covered with the remains of extenfive gardens, pavilions, mofques, and burying places, all defolate and in ruins. The environs of this once magnificent and celebrated city appear now nothing more than a fhapelefs heap of ruins; and the country round about is equally forlorn.

Delhi, a town of America, in the county of Delaware, and ftate of New York, containing 820 inhabitants.

DELIA, Δηλια, in *Antiquity*, a quinquennial feftival in the ifland of Delos, inftituted by Thefeus when, upon his return from Crete, he placed in the temple the ftatue of Venus, given him by Ariadne.

Delia, feafts celebrated by the Athenians, in honour of Apollo, furnamed *Delius*.

The principal ceremony in this feaft was an embaffy, or rather a pilgrimage, to Apollo of Delos, performed every five years by a certain number of citizens, deputed for that purpofe, and called *Deliaftæ*, Δηλιαςαι, or *Theori*, Θεοροι, *q. d.* the *feers*, and the firft perfon of the embaffy, or deputation, *Architheorus*, Αρχιθεωρος. To him were added four more of the family of the *Ceryci*, priefts defcended from Mercury, who refided all the year at Delos, to affift in the temple. The whole deputation fet out in five veffels, carrying with them every thing neceffary for the feaft, and the facrifices.

The Deliafts, who went abroad, were crowned with laurel. At their arrival, they immediately offered a facrifice to Apollo: and, after the facrifice, a number of young maids danced round the altar, a dance called in Greek γερανος, wherein, by their various motions and directions, they reprefented the turnings and windings of a labyrinth. When the Deliafts returned to Athens, the people went out to meet them, and received them with all the joy and acclamation imaginable. They never laid afide their crown till their commiffion was fully completed; and then they confecrated it to fome god in his temple.

The whole time of their going and returning, with all the ceremonies of their embaffy, was called the Delia; during which time no criminal might be executed, which was a peculiar privilege of this feaft, not allowed to any other, not even thofe of Jupiter. Thus, Plutarch obferves, that it was a day confecrated to Jupiter, when Phocion was made to

take the poiſon to which he was condemned; whereas they waited thirty days to give it to Socrates, by reaſon of the Delia.

According to Thucydides, the Delia were firſt inſtituted in the ſixth year of the Peloponneſian war, againſt the Athenians, who had extirpated the iſle of Delos, removed all the tombs out of it, and ordained that nobody ſhould either be born or die in it; but that all the ſick people ſhould be removed into a little iſland called Rhenia; though the Ionians, and the neighbouring iſlanders of Ionia, had long before that time held a ſort of Delia; that is, feaſts and games, like thoſe which the Athenians celebrated afterwards.

DELIAC, Deliacus, among the *Ancients*, denoted a poulterer, or a perſon who ſold fowls, fatted capons, &c.

The traders in this way were called Deliaci; the people of the iſle of Delos firſt practiſed this occupation. They alſo ſold eggs, as appears from Cicero, in his Academic Queſtions, lib. iv. Pliny, lib. x. cap. 50. and Columella, lib. viii. cap. 8. likewiſe mention the Deliaci.

DELIACAL Problem, *Problema Deliacum*, a famous problem among the ancients, concerning the duplication of the cube. See Duplication *of the Cube*.

DELIAN Games, games eſtabliſhed at Delos, anterior to the Olympic games, concerning which Homer is ſilent. Thucydides (lib. iii. cap. 104.) tells us, that in very remote antiquity, there were "Games of bodily exerciſe, and of muſic, in which cities exhibited their reſpective choruſes;" and, in teſtimony of this, he quotes the following verſes from Homer's hymn to Apollo:

"To thee, O Phœbus, moſt the Delian iſle
Gives cordial joy, excites the pleaſing ſmile;
When gay Ionians flock around thy fane;
Men, women, children, a reſplendent train,
Whoſe flowing garments ſweep the ſacred pile,
Whoſe grateful concourſe gladdens all the iſle,
Where champions fight, where dancers beat the ground,
Where chearful muſic echoes all around,
Thy feaſt to honour and thy praiſe to ſound."

"That there was alſo," continues Thucydides, "a muſical game, to which artiſts reſorted to make trials of ſkill, Homer fully ſhews in other verſes to be found in the ſame hymn: for having ſung the Delian chorus of females, he cloſes their praiſe with theſe lines, in which he makes ſome mention of himſelf;

"Hail! great Apollo, radiant god of day!
Hail! Cynthia, goddeſs of the lunar ſway!
Henceforth on me propitious ſmile! and you,
Ye blooming beauties of the iſle, adieu!
When future gueſts ſhall reach your happy ſhore,
And refug'd here from toils, lament no more;
When ſocial talk the mind unbending chears,
And this demand ſhall greet your friendly ears—
Who was the bard, e'er landed on your coaſt,
That ſung the ſweeteſt, and that pleaſed you moſt?—
With voice united, all ye blooming fair,
Join in your anſwer, and for me declare;
Say—the blind bard the ſweeteſt notes may boaſt,
He lives at Chios and he pleaſ'd us moſt."

Smith's Thucydides.

We cannot help pointing out another circumſtance in this hymn, which is really curious, as it implies the cultivation of a talent for imitation, at a time when ſimplicity and original genius ſeem moſt likely to have ſubſiſted, pure and untainted, by ludicrous ſimilitudes.

Homer, in verſe 162, deſcribing the employment of the Delian prieſteſſes, or nuns of the order of ſaint Apollo of Delos, tells us, that they were great adepts in the art of mimicry; and that part of the entertainment which they afforded to the numerous people of different nations, who formed their congregation, was, as the poet expreſſes it, from their being ſkilled to imitate the voices and the pulſation, (Κρεμβαλιαςυν, ſtrepitum,) or meaſure, of all nations; and ſo exactly was their ſong adapted, that every man would think he himſelf was ſinging. By the expreſſion παντων ἀνθρωπων φωνας, literally, the voices of all men, is hardly meant that theſe ladies were in poſſeſſion of the talent of *taking off* individuals, like ſome of our comedians. Φωνας ſeems only to imply national melody, or at moſt national dialects, and inflexions of ſpeech; and κρεμβαλιαςυς, national rhythm, which, in all probability, was the moſt ſtriking characteriſtic in thoſe early ages of muſic.

Homer ſeems to ſketch out the order of the performance in theſe old pagan conſervatorios, v. 158; firſt they ſung a hymn in praiſe of Apollo; then another in praiſe of Latona and Diana; then they deſcended to the celebration of human heroes and heroines of ancient times; and it ſeems to have been in this part of their performance that they exerted their mimetic powers, and charmed the nations. (Θελγυσι δε φυλ' ἀνθρωπων.)

DELIAS, Δηλιας, in *Antiquity*, the name of the ſhip in which the Delian proceſſion was annually made by the Athenians. See Delia.

DELIBACHES, formed of the Turkiſh *deli*, ſignifying mad, and denoting *mad-headed*, or Deles, in the *Military Language* of the Ottoman empire, are a corps of volunteers on horſeback in the ſervice of the pachas. Theſe ſoldiers are brave, determined, enterpriſing, and ever ready to execute the orders of their maſter in the expeditions which he commands, and in the extortions which he directs. They follow him in war, perform the office of light troops, and fight without order and without diſcipline; they ſtop and bring back to battle the runaways, and frequently precipitate themſelves into the enemy's ranks, with a boldneſs which aſtoniſhes, and which ſometimes determines the victory in their favour. When a pacha is diſgraced, or when, from any motive, he diſmiſſes his delibaches, as they are without pay, and without reſources, they then commit the moſt terrible robberies; they ſpread themſelves over the fields, the villages, and even the towns; they rob indiſcriminately, lay all under contribution, and ſtop and plunder the caravans, till they are called into the ſervice of ſome other pacha, or till ſome impoſing force has put them to flight and diſperſed them.

DELIBAMENTA, in *Antiquity*, a libation offered to the infernal gods, which was always poured downwards; hence this act was expreſſed by the word *defundere*.

DELIBERATION is a voluntary operation of the mind that is employed about what we are to do or to forbear. Every man knows, ſays Dr. Reid, (Eſſays on the active Powers of Man, p. 82.) that it is in his power to deliberate or not to deliberate about any part of his conduct; to deliberate for a longer or ſhorter time, more careleſsly or more ſeriouſly; and when he has reaſon to ſuſpect that his affection may bias his judgment, he may either honeſtly uſe the beſt means in his power to form an impartial judgment, or he may yield to his bias, and only ſeek arguments to juſtify what his inclination leads him to do. In all theſe points, he determines, he wills, the right or the wrong. The general rules of deliberation ſeem, in the abſtract, perfectly evident, and form a kind of axioms in morals. They are ſuch as theſe. We ought not to deliberate in caſes that are perfectly clear. No man deliberates whether he ought to

 chuſe

chuse happinefs or mifery. No honeft man deliberates whether he fhall fteal his neighbour's property. When the cafe is not clear, when it is of importance, and when there is time for deliberation, we ought to deliberate with more or lefs care, in proportion to the importance of the action. In deliberation we ought to weigh things in an even balance, and to allow to every confideration the weight, which, in fober judgment, we think it ought to have, and no more. This is to deliberate impartially. Our deliberation fhould be brought to an iffue in due time, fo that we may not lofe the opportunity of acting while we deliberate. It is not eafy, however, to obferve thefe felf-evident rules of deliberation. Our appetites, affections, and paffions oppofe all deliberation, but that which is employed in finding the means of their gratification, and under the influence of thefe, we may counteract and tranfgrefs thofe maxims which reafon approves. What is commonly called a fault of ignorance, is always owing to the want of due deliberation. The natural confequence of deliberation with regard to any part of our conduct, is a determination how we fhall act. When the opportunity is prefent, the determination to act is immediately followed by the action; or otherwife, when it is at a diftance. In this latter cafe, the third operation of the mind called voluntary, (the firft being ATTENTION, which fee,) occurs, *viz.* a fixed purpofe or refolution, with regard to our future conduct; and fuch a fixed purpofe to do, fome time hence, fomething which we believe fhall then be in our power, is ftrictly and properly a determination of will, no lefs than a determination to do it inftantly. Every definition of volition agrees to it. See VOLITION.

DELIBERATIVE, is applied to that kind, or branch, of *Rhetoric* employed in proving a thing, or convincing an affembly thereof, in order to oblige them to put it in execution. The deliberative kind was much in vogue among the Greeks and Romans, when the orators harangued the people.

The deliberative orations conftitute one of the three kinds into which the ancients divided all orations; the other two are the *demonftrative* and *judicial.* The fcope of the deliberative was to advife or to diffuade; and this kind of oration was employed in matters of public concern, agitated in the fenate, or before the affemblies of the people. The fubjects belonging to this kind of oration are taken from the nature and circumftances of the thing itfelf under confideration. Difcourfes of the reafoning kind muft have been almoft coëval with men's intercourfe with one another; as they no fooner began to engage in mutual converfation, than they deliberated upon their common intereft, and offered their advice to each other. The early practice of this mode of difcourfe appears from facred writ, where we find, that when Mofes was ordered upon an embaffy into Egypt, he would have excufed himfelf for want of eloquence. (Exod. iv. 10.) And Homer (Il. β. 87.) reprefents the Greeks at the fiege of Troy, as flocking like a fwarm of bees to hear their generals harangue them. Nor is this fpecies of oratory lefs confpicuous for its ufefulnefs to mankind, than for its antiquity; being highly beneficial in councils, camps, or any focieties of men. Difcourfes of the deliberative kind comprehend things public or private, facred or civil; and their chief end is either profit or intereft; and as nothing is truly profitable that is not in fome refpect or other good, what is good and beneficial, as well as juft and honourable, is the end here propofed. The principal heads of this kind of deliberative difcourfes, deducible from the nature and properties of the fubject under confideration, are fuch as follow. *Pleafure* often affords a cogent argument in fuch difcourfes, and it furnifhes an argument that has great influence on mankind in general. Quintilian, however, obferves that pleafure ought not to be propofed as a fit motive of action in ferious difcourfes abftractedly confidered, and unlefs it is defigned to recommend fomething that is ufeful. Thus Cicero (Pro Archia, c. 7.) recommends ftudy from the pleafure which attends it: "If pleafure only," fays he, "was propofed by thefe ftudies," (referring to the purfuit of polite literature,) "you would think them an entertainment becoming a man of fenfe, and a gentleman. For other purfuits neither agree with all times, all ages, nor all places; but thefe ftudies improve youth, delight old age, adorn profperity, afford a refuge and comfort in adverfity, divert us at home, are no hindrance abroad, fleep, travel, and retire with us in the country." *Profit* or advantage, when it refpects things truly valuable, is alfo a very juft and laudable motive. *Honour* will fupply another argument, that will have great influence in infpiring generous minds with ardour. Virgil (Æn. l. ii. v. 289.) has very beautifully defcribed Hector's ghoft appearing to Æneas, in the night when Troy was taken, and advifing him to depart, from this motive of honour:

"O goddefs-born, efcape by timely flight
The flames and horrors of this fatal night.
The foes already have poffefs'd the wall,
Troy nods from high, and totters to her fall.
Enough is paid to Priam's royal name;
More than enough to duty and to fame.
If by a mortal's hand my father's throne
Could be defended, 'twas by mine alone."

It is poffible, however, that the expediency of undertaking any thing which, in itfelf confidered, appears beneficial, may be queftionable; and in this cafe the circumftances that attend it will afford proper arguments for engaging in it. Accordingly, one of thefe is the *poffibility* of fucceeding. Thus, Hannibal endeavoured to convince king Antiochus, that it was poffible for him to conquer the Romans, if he made Italy the feat of the war; by obferving to him, not only that the Gauls had formerly deftroyed their city, but that he had himfelf defeated them in every battle he fought with them in that country. (Juftin, lib. xxxi. c. 5.) Moreover, an argument founded on *probability* will be ftill more likely to prevail. Hence Cicero, after the fatal battle at Pharfalia, diffuades thofe of Pompey's party, with whom he was engaged, from continuing the war any longer againft Cæfar; becaufe it was highly improbable after fuch a defeat, by which their main ftrength was broken, that they fhould be able to ftand their ground, or meet with better fuccefs than they had before. (Ad. Fam. lib. vii. ep. 3.) When the poffibility and probability of an event fail in fupplying fufficient motives for the profecution of it, and a view of real or apprehended difficulties difcourages, it may be neceffary to recur to another argument deduced from the *facility* of accomplifhing the propofed object. By this argument Cicero (Philipp. iv. c. 5.) encourages the Roman citizens in oppofing Mark Antony (who, upon the death of Cæfar, had affumed an arbitrary power) by reprefenting to them, that his circumftances were then defperate, and that he might eafily be vanquifhed. Again the plea of *neceffity* will give new force to the motive urged in favour of any undertaking; and therefore Cicero joins this argument with the former, to prevail with the Roman citizens to oppofe Antony, by telling them, that "the confideration before them was not in what circumftances they fhould live; but whether they fhould live at all, or die with ignominy and difgrace." To thefe heads may be added the confideration of the *event*, which in fome cafes carries great weight with it.

Cicero, in his oration for the Manilian law, ufes three of the arguments above ftated; reafoning from the topics of neceffity,

neceſſity, poſſibility, and probability, and in that fine diſcourſe ſupporting each by various other arguments and conſiderations. On the contrary, in another oration (Philipp. vii. c. 3.) he endeavours to diſſuade the ſenate from conſenting to a peace with Mark Antony, becauſe it was baſe, dangerous, and impracticable.

The buſineſs of giving advice, however, requires no inconſiderable degree of ſkill and addreſs. For ſince the tempers and ſentiments of mankind, as well as their circumſtances, are very various, it is often neceſſary to accommodate the diſcourſe to their inclinations and opinions of things; and hence it happens, that the weightieſt arguments are not always the moſt proper, and fitteſt to be uſed on all occaſions. Cicero, who was an admirable maſter of this art, and knew perfectly well how to ſuit what he ſaid to the taſte of his hearers, in treating upon this ſubject, diſtinguiſhes mankind into two ſorts; *viz.* the ignorant and unpoliſhed, who always prefer profit to honour, and the more civilized and polite, who prefer honour and reputation to every thing elſe. (Orat. Partit. c. 25, &c.) The ſpeech of Alexander, addreſſed to his ſoldiers, before he engaged the Perſians, as we have it in Curtius, (lib. iii. c. 10.) is finely wrought up in this reſpect. For as his army was compoſed of different nations, the parts of his diſcourſe are admirably well ſuited to their different views in the proſecution of the war. To the claſs of deliberative diſcourſes we may refer, not only all matters of advice and exhortation, but likewiſe all conſolatory and petitory ſpeeches. (Ward's Oratory, vol. i. lect. 8.) See farther on the ſubject of this article under ELOQUENCE, ORATION, PUBLIC SPEAKING, and SERMONS.

To have a deliberative voice in the aſſembly, is when a perſon has a right to give his advice, and his vote, therein. In councils, the biſhops have deliberative voices; thoſe beneath them have only conſultative voices.

DELICES, in *Geography*, a hamlet of but a few houſes in the department of the Leman, diſtrict of Geneve in France, two miles from Geneve, celebrated for having been for ſome time the reſidence of Voltaire, before he purchaſed the lordſhip of Ferney.

DELICT, in the *Law of Scotland*, is uſed to expreſs an offence of an inferior degree to a crime, to be puniſhed only by the effect of a civil action, for the reparation of private damage.

DELIGATION, DELIGATIO, that part of *Surgery* which relates to the binding up of wounds, ulcers, broken bones, &c.

That bandages are very uſeful, and even neceſſary, for curing the diſorders of the human body, is evident, not only from the teſtimony of Hippocrates, Galen, and other eminent phyſicians; but alſo from this, that there can ſcarcely be any operation in ſurgery performed without their aſſiſtance. For ſhould a ſurgeon perform an operation with the greateſt judgment and care, but miſcarry in the application of the bandage, all his endeavours will be to no purpoſe; and more eſpecially in the treatment of wounds, fractures, luxations, and amputations. And we often find that in fractures and luxations, after a proper reduction of the parts, the cure depends more on a ſkilful application of the bandage to the part affected, than on the medicines. In the caſe of violent hæmorrhages, a proper application of the bandage and compreſſes proves the moſt effectual and ſpeedy remedy, and muſt be acknowledged by every one who has any ſkill in ſurgery: not to mention that the making and applying a bandage after a neat and ready manner, is juſtly reckoned among the good qualifications of a ſurgeon; as it gains him the eſteem of the ſpectators, and the confidence of the patient, which is of great influence in forwarding the cure; for both the one and the other judge of a ſurgeon's abilities by his performance on ſuch occaſions. See BANDAGE.

DELILERS, a kind of Turkiſh huſſars, collected from Servia, Bulgaria, and Croatia. They are violent and furious, whence their name, and diſorderly in their attack, which ſome have aſcribed to their belief of predeſtination.

DELIMA, in *Botany*. See TETRACERA.

DELINEATING. See DESIGNING.

DELINEATOR, an inſtrument uſed by artiſts to delineate or draw any object upon paper.

A great variety of inſtruments have been contrived at different periods, to facilitate the operations of drawing, particularly in drawing buildings or machinery in perſpective.

A very ſimple delineator is made by fixing a plate of glaſs in a truly vertical poſition, between the obſerver and the objects to be delineated; then ſetting up a ſight, or piece of braſs plate with a ſmall hole through it, the obſerver looks through the ſight and glaſs plate at the objects, and with a pen filled with Indian ink, traces over on the glaſs all the lines he ſees in the object; to transfer the lines from this plate of glaſs to paper, two methods may be employed; one, a ſheet of wet paper may be fixed down on the glaſs, and forced againſt it by a gentle preſſure; this will take off a great part of the ink, but the picture ſo formed upon the paper will be reverſed; the other method is to fix a ſheet of paper over the glaſs, and place a ſtrong light behind the glaſs; this will enable the operator to ſee the lines through the paper and trace them upon it.

Another delineator is made by fixing up a frame, acroſs which, a number of very fine threads are ſtretched, croſſing one another at right angles, and dividing the frame into a great number of ſmall ſquares. The paper on which the drawing is to be made, is alſo ruled with a like number of ſquares, the obſerver looks through a fixed ſight, and obſerves in what ſquare any object he wiſhes to repreſent may be found, he then draws the object in the correſponding ſquare upon the paper; in this manner he proceeds until the whole picture is finiſhed.

Fig. 1. *Plate of Drawing inſtruments* repreſents an inſtrument for drawing in perſpective. A B D E is an eaſel ſimilar to thoſe uſed by painters, except in having four legs inſtead of three; it is uſed to ſupport a frame or drawing board, whereon the paper *a b d e* is fixed; the frame is ſupported by a roller faſtened upon its lower ſide, reſting upon two pins in the eaſel, and it is ſet in a vertical poſition by two pieces of braſs plate *f g*, faſtened to the eaſel and ſcrewed to the frame; the ſcrews paſs through long ſlits in the braſs plates, ſo that the frame can be adjuſted to be truly vertical; *h i k* is a T ſquare, in the plane of which is a groove to contain a ſlider carrying two points *l m*; the ſtock of the ſquare ſlides upon the lower ruler of the board, and has a fillet entering a groove therein, that it may not be eaſily diſplaced; the end *h*, of the blade of the ſquare, is received into a groove in the top ruler of the frame; *n* is a piece of wood faſtened to the top ruler by a ſcrew paſſing through a long ſlit in the piece, which allows it to be fixed at any diſtance from the top ruler, and at any angle with it; *n*, a ſhort rod, ſliding up and down through *n*, and fixed at any point by a ſcrew, it carries a braſs plate perforated with a ſmall hole for a ſight, and which may be fixed at any height or diſtance from the frame, to give the beſt view of the object. The manner of uſing this inſtrument is exceedingly ſimple; the operator looks through the ſight-hole at any object he wiſhes to delineate on the paper *a b d e*, and brings the point *l* to interſect the object; this he does by ſliding the ſquare until the point is brought into the ſame vertical line with the object, and by

ſliding the point up or down in the groove in the blade of the ſquare, it will be brought to cover the object; he then marks the point *m*, and finds another in the ſame manner; when points are thus found, it will be eaſy to connect them by lines, and thus complete the outline; the point at *m* ſhould be fixed to a ſpring, the tendency of which is to throw it off the paper, a braſs button ſhould be fixed on the end of the point, by preſſing which it will prick the paper; an inſtrument of this kind was contrived by Mr. James Peacock, who publiſhed an account of it in the Philoſ. Tranſactions. The frame of this machine will alſo explain the manner in which the two foregoing inſtruments may be ſupported.

Figs. 2, and 3, are repreſentations of a delineator deſcribed in the Philoſophical Journal, vol. i. by Mr. R. L. Edgeworth, who aſcribes the invention to Miſs Maria Edgeworth; the machine is exceedingly ſimple, conſiſting of three mahogany boards; *a b d*, *fig.* 2, joined together by hinges, which are connected with a common drawing board, *e f g*, to *fig.* 3, by ſcrewing the board *a* to the drawing board, and by putting one end of the paper under the board *a*, it will be fixed down; *k* is the ſight, capable of being elevated or depreſſed as occaſion requires: in uſing the inſtrument the obſerver looks through the ſight, the boards being laid out flat as in *fig.* 2, and directs the point of the index *l m*, to interſect the object he wiſhes to delineate; he then doubles up the machine as in *fig.* 3, bringing the index upon the paper, but taking care not to move the index with reſpect to itſelf; he then marks the place where the point of the index lies, and makes another obſervation; having thus obtained ſeveral points, he proceeds to draw the lines and finiſh the outline.

The camera obſcura is frequently uſed as a delineator, for a deſcription of which ſee that article; though the ſize which this inſtrument muſt have to anſwer the purpoſe effectually, is an objection to it, which, however, applies to all the machines we have hitherto deſcribed. The optigraph, invented by the celebrated Ramſden, ſhewn in *figs.* 4 and 5, poſſeſſes ſeveral advantages over the other machines, as it is portable, and the obſerver views whatever he is going to draw through a teleſcope, enabling him to delineate more minute objects than can be correctly done by any other method. Since the deceaſe of this great artiſt, Mr. Thomas Jones, of Mount-ſtreet, Berkeley-ſquare, London, a pupil of his, has improved the conſtruction of the inſtrument, particularly in adapting the means whereby the drawing made by the machine may be enlarged or diminiſhed, without removing the inſtrument to a greater diſtance from the object; a drawing and deſcription of this inſtrument are to be found in the Philoſophical Magazine, vol. xxviiii. p. 67. *Fig.* 4. is a perſpective view of this inſtrument, A repreſents the drawing board, on the outſide frame of which is fixed the pillar of the inſtrument B, C is a tube (ſliding in the pillar), on the top of which is fixed, by means of a ſcrew *c*, the frame D; at the end of this frame is a plain mirror E, beneath which is ſuſpended by a univerſal joint, the teleſcope F, of which G is the eye tube. H are ſliding tubes, capable of being ſhortened or lengthened in the ſame proportion as the inſide ſpeculum *c*, *fig.* 5, which is fixed to any place by the clamp ſcrew E. The pencil L, of which *h* is the handle, ſlides perfectly eaſy, without ſhake, in the tubes H: the pencil is ſo contrived as to have all the freedom of a pen when held in the hand for uſe.

Fig. 5, repreſents a ſection of the teleſcope, being the principal part of the invention. The rays from an object coming to the plane mirror E, are reflected into the teleſcope, paſſing through the object glaſs *b*, and entering the ſpeculum *a* are reflected through the eye-glaſs *d*, to the eye at *e*; *f* is a piece of parallel glaſs, with a ſmall dot on its centre, exactly in the focus of the eye-glaſs *d*.

Mode of uſing the Optigraph.

Fix the drawing board to the table (by a clamp which is packed in the box), ſo that the ſurface of the mirror E is nearly parallel to the object; then take hold of the handle *h*, and hold the pencil on that part of the paper where you would wiſh the centre of your drawing, or any part thereof, to be. Then place your eye at the eye tube G, and with your left hand alter the inclination of the mirror E, until the ſmall dot deſcribed at *f*, in *fig.* 5, is on ſome particular part of the object that you wiſh to begin with, adjuſting the teleſcope to diſtinct viſion by the milled head P. Then by moving your hand (having the pencil), you paſs the dot ſeen in the field of the teleſcope over the object, the pencil marking it at the ſame time on the paper.

To make your drawing larger, pull out the tube of the pillar C, *fig.* 4, and fix it with the ſcrew *e*; then pull out the ſliding tubes H, till the pencil is within half an inch of the paper (in the middle of the board) and proceed as before. This inſtrument will pack in a box 14 inches long, 3 deep, and 6 inches wide.

The next delineator we ſhall deſcribe is the camera lucida, invented by Mr. W. H. Wollaſton, and for which he took out a patent in 1806; for portability this exceeds all other inſtruments for the ſame purpoſe. It is repreſented in *fig.* 6, which only explains the ſtand or ſupport for the inſtrument; its principle is explained by *fig.* 7; *a b d e*, is a ſection of a glaſs priſm.

The priſm when in uſe is fixed with the ſide *a b* towards the objects to be delineated, and the eye at the angle *e*; the rays from the objects enter at the ſide *a b*, and falling upon *b* are reflected by it to *d e*, and from thence to the eye at *e*, entering it in a direction perpendicular to what they came to the priſm; in this manner a picture of whatever is before the ſide *a b* is repreſented upon the ſurface *e d*; now to transfer this picture to paper, the eye is ſo placed at *e*, that one half of the pupil is employed in viewing the reflected objects, while the other half ſees (by direct viſion clear of the ſide *e d* of the priſm) the paper placed on a table beneath the priſm at *f g*; now a pencil or pen may be traced over this paper, and will appear to the eye as though it was traced over the reflected image. This priſm is mounted in a braſs caſe, leaving open ſuch places as are neceſſary as ſeen in *fig.* 6; a pin *h* is fixed to the caſe of the priſm, and paſſes through a piece of braſs jointed to a tube, *i*. This tube ſlides up and down within another, *k*, which is fixed by a joint to a clamp, *l*, ſcrewed to the table whereon the paper is laid. By ſliding out the tube, *i*, the priſm may be ſet at any height from the table and the ſeveral joints; it may be put in any poſition, ſo as to throw the image upon the proper part of the paper. As the principle of the inſtrument depends upon ſeeing the reflected images of the objects, and the direct viſion of the pencil at the ſame time, the leaſt motion of the eye, at *e*. *fig.* 7, would cauſe it to ſee either the reflected image in the ſurface *d e* alone, or ſee only the pencil and paper at *f g*; to prevent this, a piece of braſs plate, *n*, *fig.* 6, is fixed on by a ſcrew, round which it turns as a centre; it has a ſmall hole through it which can be adjuſted by moving the braſs, to ſee the reflected image and the pencil both at once, ſo that a drawing may be made; but if the pencil ſhould not appear diſtinct enough, the braſs muſt be moved outwards from the priſm; this will enlarge the aperture for direct viſion, and diminiſh that of reflection; on the contrary, if the reflected image ſhould not appear diſtinct enough, the braſs ſight ſhould be moved towards the priſm.

Thoſe perſons whoſe ſight is not quite perfect, will not

fee both a diftant and a near object (when brought into one field) with the fame diftinctnefs; to remedy this, two lenfes, *r s*, *fig.* 3, are fixed by joints beneath the prifm, the lens. *r*, is convex, and muft be interpofed between the eye and the pencil, as in the figure. for thofe perfons who can fee diftant objects more diftinctly than near ones; on the contrary, near fighted people who cannot fee diftant objects diftinctly, muft have a concave lens, *s*, turned up before the fide, *a b*, of the prifm, and, *r*, turned down out of the way.

The prifm being brought fo near the eye, may be very fmall; *fig.* 7, is the fection of it at the full fize, and the whole inftrument packs in a box 2 inches wide, 8 long, and half an inch thick, outfide meafure.

DELINQUENT, a perfon who has committed fome fault, or offence.

It is the bufinefs of a magiftrate to be fevere in punifhing delinquents.

DELIQUESCENCE, in *Chemiftry*, is the fpontaneous liquefaction of any faline fubftance, by means of the moifture which it attracts from the air.

DELIQUIATED Potash, is applied generally to the fub-carbonate of potafh or falt of tartar, when run into a liquid by expofure to a damp air.

DELIRIUM, in *Medicine*, an alienation of mind connected with fever.

This is the fenfe in which delirium is commonly underftood; but by fome writers, as Hoffman, Sauvages, &c. delirium is the term employed to denote the whole clafs of mental derangements, including the different forms of mania, melancholy, febrile delirium, and fo forth.

Etymologifts have derived the term delirium from *de* and *lira*, *i. e.* departing from the right way; *lira* fignifying a ftraight furrow carried through a field. Others have preferred a derivation from λῆροι, *leræ*, or *liræ*, trifles, or abfurdities. Van Swieten, ad Aph. 700.

Boerhaave defines delirium, "the production of ideas not correfponding with external caufes, but with an internal difpofition of the brain, attended with an erroneous judgment, the refult of thefe ideas." Aph. 700. Dr. Darwin expreffes the fame notion in other terms. "The ideas in delirium confift of thofe excited by the fenfation of pleafure or pain, which precedes them, and the trains of other ideas affociated with thefe; and not of thofe excited by external irritations, or by voluntary exertion." Zoonomia, vol. ii. clafs ii. ord. i. gen. 7. Both thefe definitions point out the diftinguifhing character of febrile delirium; namely, that it originates from a certain phyfical condition of the brain: but they are perhaps both, in fome degree, incorrect, in excluding external impreffions from among the caufes of the delirious ideas. It is true, indeed, that the internal fenfations, and efpecially thofe arifing from the peculiar condition of the circulation in the brain, or of the brain itfelf, are the primary caufes of delirium; and, accordingly, delirium firft occurs between fleeping and waking, efpecially in the dark; under which circumftances external impreffions on the fenfes are in a confiderable degree excluded. In this early period, or incipient degree of delirium, when the full opportunity is afforded by the patient awaking completely, and by the return of light, for the operation of external impreffions, fince the power of judgment ftill remains, the morbid affociations are corrected, and delirium ceafes; until the fenfes are again deprived of their acutenefs and activity by an imperfect fleep. But when the morbid condition of the brain is much increafed, by the increafe of the febrile difeafe, the faculty of judgment is diminifhed, and the powers of affociation and imagination are morbidly increafed, infomuch that the external impreffions on the fenfes, when they are attended to by the mind, become alfo the caufes of a train of delirious ideas. Hence the room, in which the patient lies, is not known to him, but is conceived to be a church or a prifon, &c. according to the affociations, which particular impreffions at different times excite; the perfons about him are not known, or viewed partly in their true character, and partly in a fictitious one, as morbid affociations are connected with correct impreffions of their perfons, in an incongruous manner.

Delirium, then, may be confidered as a fort of waking dream, in which the faculties of affociation and imagination are morbidly excited, in confequence of a peculiar condition of the brain and nervous fyftem, connected with fever.

The nature of delirium may be illuftrated, therefore, by comparing it with our common dreams; and its various degrees may be traced, from the unpleafant or frightful dreams occafioned by a loaded ftomach, or a flight ephemeral feverifhnefs, up to the moft violent frenzy, accompanying inflammation of the brain. In our ordinary dreams, when the accefs of external impreffions is prevented, the fenfes being, as it were, fhut up, and the powers of judgment and volition fufpended, the internal fenfations, with their affociations, alone excite the train of ideas. This train runs on, upon the principle of affociation alone, from fcene to fcene, and from fubject to fubject, connecting thus the moft incongruous affemblage of ideas; which, if uttered aloud, would be as apparently unconnected as thofe of the moft delirious perfon; but which, under this fufpenfion of external fenfe and volition, excite no furprife to the dreamer, by their extreme incongruity, becaufe no comparifon is made, no act of judgment is exerted. As the faculty of affociation is the leading principle in carrying on thefe trains of our fleeping ideas, their continuance is endlefs; and in like manner there is a perpetual flow of ideas in delirium, continuing with more rapidity under the increafed excitement of the brain and nervous fyftem. The facility, with which various trains of ideas are affociated, in dreams, with particular corporeal fenfations, may be illuftrated by the experience of almoft every individual. Mr. Stewart, in his "Philofophy of Natural Hiftory," relates, that he was diftreffed by a dream, in which he fuppofed himfelf hung up by the throat, upon hooks, in the infernal regions, and furrounded by all the fuppofed tortures, affociated with that idea; and, on waking, he found himfelf fuffering under the irritation of a fore throat, the pain of which had excited this fingular train of ideas. In the fame way an oppreffion about the præcordia, arifing from a loaded ftomach, or an uneafy pofture, during fleep, excites the ideas of thofe horrible figures, fitting or lying on the breaft of the dreamer, which perfons attacked with *incubus*, or night-mare, are faid to experience. And again, when the fleep is lefs complete, and the fenfes, as of hearing, touch, and fmell, are more open to impreffion, noifes, and other irritations, imperfectly and indiftinctly perceived, mingle, neverthelefs, with our dreams, and become the caufes of different trains of affociation. See Dreams.

When a flight febrile action is induced, as from a common cold; from an over dofe of fome ftimulant, as wine, or fpirits; or from fome narcotic medicine, fuch as opium; a ftate of the brain and nervous fyftem is produced, which greatly increafes this difpofition to affociate various trains of ideas, with the fenfations and irritations of the different parts of the body; and the dreams are inceffant and various. If the fenfations are pleafurable, the dreams are agreeable; if, on the contrary, as is generally the cafe, the fenfations approach to pain, the affociated ideas are of a difagreeable nature, and imaginary objects of terror and danger are brought before the mind.

If the febrile condition is more completely eftablifhed, the fenfations of the body become more generally painful, the whole nervous fyftem is in a difturbed ftate, and the brain itfelf is particularly excited; fo that the mind is engroffed, as it were, by the internal fenfations, which, in this fenfitive condition of the brain, make the greater impreffion, and thofe of external objects excite little of its attention; or, when they are perceived, combine with the others to produce the delirious dreams of the patient.

As the excitement ftill farther increafes, he utters his dreams aloud, and his words, of courfe, are characterized by all the incongruity of the ideas, which they reprefent. When the excitement proceeds to a ftill higher pitch, and efpecially when it amounts to inflammation of the brain, the train of delirious ideas becomes ftill more rapid and incongruous, it calls the paffions forth, and is combined with great reftleffnefs of the mufcles, and impatience of reftraint; which conftitute frenzy, and with certain other fymptoms mark the exiftence of phrenitis.

The delirium, when arrived at this degree, (the *delirium ferox* of writers) is evidently the confequence of an increafed action of the arteries of the brain, and therefore of an increafed quantity and impetus of the blood in that organ. The appearances of external inflammation teach us, that the fenforial functions of every part are increafed by an increafed quantity and impetus of the blood, which circulates through it. Hence the pain, the acute fenfibility, of a common boil or whitlow. And that fuch is the condition of the brain, where there is violent delirium, we have evidence both from the accompanying fymptoms, and from examinations after death. The fymptoms accompanying violent delirium, are generally rednefs of the countenance, pain in the head, ftrong arterial pulfations, a ferrety rednefs of the eyes, which are acutely fenfible to light, &c.; and on diffection, a rednefs has been obferved in different parts of the brain, and in its membranes, on which coagulable lymph has been poured out, adhefions formed, pus collected, and fo forth. Various degrees of this delirium, then, are connected with more or lefs of a morbid determination of blood to the brain.

A delirium, however, occurs under other circumftances of the brain, which is different in its character, and is called a low delirium, *delirium mite*. This is generally confidered by writers as the refult of a circulation through the brain too languid to fupport its functions. The ideas flow lefs rapidly than in the acute delirium; and the patient lies on his back, muttering to himfelf, and altogether inattentive to what is paffing around him; in fhort in a ftate approaching rather to ftupor, than to active thought. From this he can at firft be roufed for a few moments, and be made fenfible to external impreffions, even to queftions put to him; but he fpeedily relapfes into inattention; and, as the difordered ftate or atony of the brain is increafed, this degenerates into complete ftupor; he becomes infenfible to all the calls of nature, fo that he feels not even the thirft, which parches his throat, and the urine and fæces are evacuated unconfcioufly. If the difeafe ftill proceeds, *fubfultus tendinum*, tremors, convulfions, and death enfue.

With this fpecies of delirium, the concomitant fymptoms mark a deficiency of nervous energy, and of the impetus of the circulation. It occurs in the laft ftages of low fevers, fometimes in the cold ftage at the commencement. (Cullen.) The pulfe is fmall and feeble, the countenance pale and funk, the general ftrength much impaired, and giddinefs is fometimes obferved, on affuming the erect pofture. The pain of the head is dull and heavy, not acute, as in the former fpecies of delirium. And, it may be added, that the former fpecies is fometimes converted into this, when the ftrength of the patient is greatly funk. It muft be obferved, however, that the brain and nervous fyftem are affected, in fevers, in a way not altogether to be accounted for, from the ftate of the circulation; as there is often, from the commencement, a remarkable proftration of the animal powers.

Delirium of either fpecies, when exifting in any confiderable degree, affords an unfavourable prognofis, as to the event of the fever: but the exiftence of the low delirium is confidered as lefs unfavourable than that of the acute. For although both imply a morbid derangement of the functions of one of the moft important organs of life; yet the atonic ftate, if we may ufe the term, is lefs liable to occafion irremediable injury to the brain, and is more eafily removed, than the ftate of high excitement, which accompanies the violent delirium.

The occurrence of delirium may be often anticipated from an obfervation of the other fymptoms. When the head-ache is very acute, when there is great reftleffnefs and indifpofition to fleep, when the eyes are acutely fenfible to light, or other fymptoms of a particular determination of blood to the head are prefent, delirium may be expected to follow. Huxham has remarked, on the fame principle, that a ftrong pulfation of the carotid arteries, in the advanced ftage of fever, although the pulfe at the wrift may be fmall, nay even flow, "is a certain fign of an impending delirium, and generally proceeds from fome confiderable obftruction in the brain." (Effay on Fevers, p. 94.) Many fymptoms of impending delirium are enumerated by Hippocrates, in his book on prognoftics, fome of which, however, feem to be fanciful, and others to apply rather to infanity than to febrile delirium.

As delirium is of two fpecies, and connected with two oppofite conditions of the fenforium, it is obvious that the remedies by which it muft be combated, muft be varied according to its nature, and the concomitant fymptoms. When it is of the acute fpecies, and evidently connected with an increafed action in the brain, the indication will be to diminifh the arterial action, and thus to leffen the quantity and impetus of the blood, fent to that organ. This indication may be accomplifhed by the local abftraction of blood from the head; as by the application of leeches, or the cupping-glaffes, to the temples or neck; by fhaving the head, and reducing its temperature, by wafhing with cold water, or water and vinegar; or by applying a bliftering plafter over the fcalp, or on the neck. And where there is, at the fame time, a great general increafe of the arterial action, thefe operations may be aided by whatever tends to diminifh the general fever. Hence the general affufion of cold water, the ufe of the fhower-bath, or wafhing the whole furface by means of a fponge, is often extremely efficacious in removing delirium. At the fame time, the general antiphlogiftic regimen, the free ufe of diluent drinks, laxative medicines, and cool air, fhould be enjoined; and every fource of irritation whatever, fuch as ftrong light, noifes, converfation of vifitors, motion or exertion of the body, &c., fhould be ftudioufly avoided. In this ftate of excitement of the brain and nervous fyftem, circumftances which ordinarily have little or no influence, irritate to a pernicious degree. Hence if the bowels are loaded, the removal of the irritating fæces by a laxative will fometimes remove the delirium; and the abftraction of other irritations diftant from the brain, will often have a fimilar beneficial effect.

In the low delirium, occurring in fevers with great debility, where the heat of the fkin is not increafed, and there are no marks of active determination to the head, a different plan of treatment is required. The patient muft be fupported by the frequent adminiftration of cordial medicines, of which wine is perhaps the beft. Where there is much watching and

and reftlefsnefs, an opiate will often contribute greatly to correct the delirium, by inducing fleep, and foothing the nervous fyftem, which it renders lefs fenfible to the little irritations of the febrile ftate. Small quantities of liquid nutriment fhould be frequently adminiftered, in aid of the fupport afforded by the cordials. If the ftrength finks rapidly, the more powerful ftimulants of alcohol, æther, and the volatile medicines will be requifite. See Gregory Confpectus Medicinæ Theoret. Van Swieten. ad Aph. 700 et feq. Cullen, Firft Lines, 45.

DELITZSCH, anciently Deliz, *Delitium*, in *Geography*, a fmall town of Saxony, in the circle of Leipzig, on the river Löber; 12 miles N. of Leipzig, on the road to Deffau; was built in the tenth century by the Vandals, and has a royal palace and garden. It contains 3000 inhabitants, and is remarkable for its manufacture of worfted ftockings, and a printing prefs, which has been eftablifhed here above 120 years. The town is encircled by double rows of lime and willow trees, which afford very pleafant walks.

DELIVER, *To*, to give freedom, or to releafe any one from confinement, captivity, or bondage, to relieve the mind oppreffed with care, anxiety, or trouble, or to furrender or give up any place or property. It is alfo ufed for utterance, as to fpeak, or deliver a difcourfe. In midwifery it means to bring a child into the world.

DELIVERANCE, in *Law*, a term ufed when a criminal is brought to trial, and the clerk in court afks him whether he is guilty, or not guilty, to which he replies not guilty, and puts himfelf on God and his country; and the clerk wifhes him "a good deliverance."

Deliverance, *a writ of fecond*, a judicial writ, iffuing out of the original record, allowed by the ftatute of Weftm. 2. c. 2. to the plaintiff, who is reftrained by it, when non-fuited, from fuing out any frefh replevin, fo called becaufe he has the fame diftrefs again delivered to him, on giving the like fecurity as before. If the plaintiff be a fecond time non-fuit, or if the defendant has judgment upon verdict or demurrer in the firft replevin, he fhall have a writ of "return irreplevifable;" after which no writ of fecond deliverance fhall be allowed. (2 Inft. 340.) But in cafe of a diftrefs for rent arrere, the writ of fecond deliverance is in effect taken away by ftatute 17 Car. II. c. 7., which directs another procefs. 1 Vent. 64.

Deliverance, *Cape*, in *Geography*, a cape on the coaft of New Guinea, in the Eaft Indian ocean. S. lat. 11° 30'. E. long. 157° 50'.

DELIVERY, in *Midwifery*, the act of parturition, or of bringing into the world a full grown fœtus. See Labour.

Delivery, in *Law*, is an effential requifite of a valid deed, which is done by the party himfelf, or his attorney, lawfully authorifed, and expreffed in the atteftation. This delivery is either abfolute, *i. e.* to the party or granter himfelf; or conditional to a third perfon to hold, till fome conditions be performed on the part of the granter. See Deed.

Delivery, in *Oratory*. See Pronunciation.

DELIUM, or Delion, in *Ancient Geography*, a town of Greece, in Bœotia, fituated on the fea-coaft, on the frontiers of the territory of Tanagra and Attica, N. of the mouth of the Afopus. It had a temple dedicated to Apollo. In the time of Paufanias it had two ftatues, one of Diana, and another of Latona.

DELIUS, Christopher Traugott, in *Biography*, was born at Wallhaufen in Thuringia. Being of a noble and wealthy family, he was brought up for the army, in which he ferved a long time. He afterwards applied himfelf with much diligence to the fciences, embraced the Catholic religion, and obtained a place in the eftablifhment of the Hungarian mines, where he rofe to the poft of profeffor in the academy of mines at Chemnitz. Having fuftained this character with much reputation he was at length invited to Vienna, where he was employed in the department of the mines and the mint. He died at Florence in January 1779, in the fifty-firft year of his age. As an author he bears a very refpectable character. His works are, "A Differtation on the Origin of Mountains, and of the different kinds of Veins found in them; alfo of the mineralization of Metals, and particularly of Gold." "An Introduction to the art of Mining, both in theory and practice, together with a treatife on the principles of the economy of Mines." The latter was tranflated into French, by the order and at the expence of the king of France.

DELKENHEIM, or Telkenheim, in *Geography*, a fmall town of the grand duchy of Heffe Darmftadt, in Germany, fituated in the diftrict of Epftein.

DELKIRAS, a town of Afiatic Turkey, in the province of Natolia; 40 miles W. of Tocat.

DELLAMCOTTA, a fortrefs of Afia, in the country of Bootan, which commands the principal pafs over the fouthernmoft ridge of the Bootan mountains, that rife nearly 1½ mile perpendicular above the plains of Bengal, in a horizontal diftance of only 15 miles. This fort was taken by ftorm in 1773, by a detachment under the command of capt. John Jones; the fame of which exploit made the Thebetians fue for peace. It is 50 miles diftant from Taffafudon, and 175 N. from Moorfhedabad.

DELLE, a fmall town of France, in the department of the Upper Rhine, chief place of a canton, in the diftrict of Befort, with a population of 810 individuals, 6 miles N. W. of Porentruy. The canton has an extent of 192½ kiliometres, 27 communes, and 8952 inhabitants.

Delle, *Cape*, a cape of Africa, in the Mediterranean, on the coaft of Algiers. N. lat. 37° 15'. E. long. 4° 13'.

DELLYS, or Teddeles, a fea-port of Africa, in the country of Algiers; 15 leagues E. of Algiers.

DELME, a fmall town of France, in the department of the Meurthe, chief place of a canton, in the diftrict of Chateau-Salins. It has only 374 inhabitants. Its canton has a population of 5215 individuals, difperfed in 22 communes, upon a territorial extent of 127 kiliometres and a half. —Alfo, a fmall river of Germany, in the county of Delmenhorft.

DELMENHORST, a town of Germany, in the duchy of Holftein Oldenburg, chief place of the county of the fame name, fituated on the river Delme not far from the Wefer, 9 miles S. W. of Bremen, and 21 miles S.E. of Oldenburg. N. lat. 53° 10'. E. long. 8° 11'. This county and Oldenburg belonged to Denmark till the year 1773, when both were exchanged againft the duchy of Holftein.

DELMONT, Deodato, in *Biography*, an hiftorical painter, was born at St. Tron in 1581, of a good family, who gave him a liberal education, and placed him with Rubens to learn defign and colouring. Being the intimate friend, as well as difciple of this illuftrious painter, he accompanied him to Italy, and at Rome fo diligently and fo fuccefsfully profecuted his ftudies in painting, ftatuary, and architecture, that he obtained the reputation of being an excellent painter and architect. At the court of Newburgh, where he was employed for a long time, he was ennobled in token of his merit. Several excellent paintings of this mafter are preferved in the churches and convents of Italy; and at Antwerp there are three capital performances; *viz.* the Transfiguration in the church of Notredame, Chrift carrying his crofs in the Jefuits' church, and the Adoration of the Magi, in a cloifter. In all his fubjects the compofition is

elevated,

elevated, the defign correct, and the colouring and pencilling excellent. The praife of Rubens is of itfelf fufficient to immortalize this artift, who died in 1634. Pilkington.

DELOS, in *Ancient Geography*, an ifland of the Ægean fea, or Grecian Archipelago, fituated nearly in the centre of the *Cyclades* (which fee) and placed by Pliny, (l. iv. c. 12.) at the diftance of 15 miles from Myconus, 18 from Naxos, and 50 from Icaria. But thefe diftances are undoubtedly erroneous, as Myconus is diftant from Delos only 3 miles, and Naxos 40. This ifland was known to the ancients by the names of Cynethos or Cynthos, Afteria, Pelafgia, Chlamydias, Lagia, Pyrpilis, Scythias, Mydia, and Ortygia. It was named Ortygia and Lagia, from two Greek words, *ortyx* and *lagos*, the former fignifying a quail, and the latter a hare, the ifland formerly abounding with both thefe animals. The name Delos is derived by the Etymologifts from a Greek verb fignifying to *appear*, but they differ as to the reafon of its being appropriated to this ifland. Pliny, after Ariftotle, pretends that the name was given to this ifland, becaufe it rofe unexpectedly out of the fea, and appeared floating on the water. Some fay that it was called Delos or manifeftation, becaufe it was the birth-place of Apollo, the fymbol of the fun, and becaufe the beams of this luminary enlighten the whole earth. The poets pretend that this ifland was named Delos, becaufe Latona, being delivered of Apollo and Diana, fhowed herfelf firft here, not having dared to appear before, for fear of Juno. The fable reports that it floated at the mercy of the winds; but Herodotus examined it with attention, and denies the fact. Some fabulous writers fay that it was fixed by the voice of Neptune, and others pretend that it was raifed by a blow of his trident from the bottom of the fea, in order to accommodate Latona, the miftrefs of Jupiter, with a place for the birth of her children, when fhe was perfecuted by Juno. Strabo reprefents it as an ifland of fmall extent; and, according to Pliny, it was not more than 5 miles in compafs; but Tournefort affigns it a circuit of 7 or 8 miles. The native deities, Apollo and Diana, had three very magnificent temples erected for them in this ifland. That of Apollo was, according to Strabo, (lib. x.) begun by Eryfiapthus, the fon of Cecrops, who is faid to have poffeffed this ifland 1558 years B.C.; but it was afterwards much enlarged and embellifhed at the general charge of all the Grecian ftates. But Plutarch fays, that it was one of the moft ftately buildings in the univerfe, and defcribes its altar, as deferving a place among the feven wonders of the world. The infcription in this temple, as Ariftotle informs us, (Ethic. l. i. c. 9.) was as follows: "Of all things the moft beautiful is juftice; the moft ufeful is health; and the moft agreeable is the poffeffion of the beloved object." The trunk of the famous ftatue of Apollo, mentioned by Strabo and Pliny, has been for ages an object of admiration to travellers; its fize was gigantic, though cut out of a fingle block of marble, the fhoulders being fix feet broad, and the thighs nine feet round. Round the temple of Apollo were magnificent porticoes, built at the charge of various princes, as appears from the ftill legible infcriptions. To this temple the neighbouring iflands fent yearly a company of virgins to celebrate with dancing the feftival of Apollo, and his fifter Diana, and to make offerings in the name of their refpective cities.

Delos was held in fuch reverence by moft nations, that even the Perfians, after having laid wafte the other iflands, and every where deftroyed the temples of the gods, fpared Delos; and Datis, the Perfian admiral, forbore to anchor in that harbour. This ifland was celebrated both by the poets and hiftorians of antiquity: the poets, it is faid, by Callimachus, prefented in this place the firft tribute of their fervices; for the favour of Apollo could not be obtained any where elfe. Pieces of mufic and poetry were diftributed at the games celebrated here in honour of Apollo. See DELIAN *Games*. The Athenians made an annual proceffion to the ifland of Delos. The author of this ceremony was Thefeus, who being fent with other Athenian youths into Crete (fee CRETE,) to be devoured by the Minotaur, made a vow to Apollo, that if he granted them a fafe return, they fhould make a folemn voyage to his temple in Delos every year. We learn from Strabo and Callimachus, that this ifland was watered by the river Inapus. Pliny calls it a fpring, and adds, that its waters fwelled and abated at the fame time with thofe of the Nile, as if there had been a communication between the Nile and the Inapus. The ifland has now no river, but one of the nobleft fprings in the whole Archipelago, being twelve paces in diameter, and enclofed partly by rocks, and partly by a wall. This ifland was anciently governed by kings; for Virgil mentions a king named Anius, who reigned here in the time of the Trojan war. He was both king and high-prieft of Apollo, and entertained Æneas with great kindnefs. This prince was defcended from Cadmus, and had by his wife Dorippe three daughters, who are feigned by the poets to have derived from Bacchus the power of changing whatever they touched into wine, wheat-feed, or oil; alluding to the great quantity of wine, wheat, and oil, which accrued to their father from the offerings made to Apollo. Jofhua, it is faid, in the 15th century before Chrift, having driven the Phœnicians from the land of Canaan, they paffed into the iflands of the Ægean fea, and eftablifhed themfelves in thefe iflands, and particularly in that of Delos. Thucydides fays, that thefe people, blended with the Carians, practifed piracy. The Athenians, who afterwards made themfelves mafters of Delos, were commanded by an oracle, as Herodotus informs us, (lib. i. c. 64). to purify the ifland, which he did by caufing all the dead bodies to be taken up, and removed from all places within the profpect of the temple. In the 6th year of the Peloponnefian war, the Athenians, by the advice of an oracle, purified it anew, by carrying all the dead bodies to the ifland of Rhenæa, where they were interred. Having then cleared it from fepulchres, in order to preferve it from pollution, they publifhed an edict, enacting that for the future no perfon fhould be fuffered to die, nor any woman to be brought to bed in the ifland; but when death or parturition approached, they fhould be carried over into Rhenæa. In memory of this purification, the Athenians inftituted a folemn feaft, which was celebrated every fifth year, (fee DELIA;) people affembling on that occafion to Delos from the neighbouring iflands, and all parts of Greece. A few years after, the Athenians, to complete the purification of the ifland, expelled all the ancient inhabitants, whom they pretended to be polluted, on account of a crime committed by them in former times, but not mentioned by our hiftorians. The Athenians were driven out by Mithridates the Great, who plundered the rich temple of Apollo, and obliged the Delians to take part with him. Mithridates, in his turn, loft it to the Romans, who granted many privileges to the inhabitants, and exempted them from all kinds of tribute and taxes. The lands are now fo covered with ruins and rubbifh, as to admit of no fort of culture; yet the inhabitants of Myconi hold it, by paying ten crowns land-tax to the grand Signior.

The oracle of Apollo, in Delos, was one of the moft famous oracles in the world, not only for its antiquity, but for the richnefs of the facred prefents dedicated to the god, and the numbers of perfons that reforted hither from all parts for advice; in which refpect it furpaffed not only all the oracles of other gods, but thofe of Apollo himfelf, that of Delphi alone excepted. Some writers fay, that the ifland had the name

name of Delos, from the clear and fimple terms in which the anfwers were here given by the oracle, contrary to the ambiguity obferved in other places; but it was confulted only while Apollo made Delos his fummer refidence, for his winter abode was at Patara, a city of Lycia. The prefents offered by the votaries to Apollo, were laid in the altar already mentioned, which altar, as fome fay, was erected by Apollo himfelf, when he was only four years old, and formed of the horns of goats, killed by Diana, on mount Cynthus. It was preferved pure from blood and every kind of pollution, as offenfive to Apollo. The whole ifland was an afylum, which extended to all living creatures, dogs excepted, which were not fuffered to be brought on fhore, and therefore it abounded with hares.

Delos, the capital of the ifland of the fame name. It occupied, as its magnificent ruins evince, that fpacious plain which reaches from one coaft to the other, and extends eaftward as far as the Ifthmus. It was the richeft city in the Archipelago, efpecially after the deftruction of Corinth; merchants being allured hither from all parts, by the immunities they enjoyed, and by its convenient fituation between Europe and Afia. Strabo calls it one of the moft frequented emporiums of the world; and Pliny tells us, that all the commodities of Europe and Afia were fold, purchafed, or exchanged there. It contained many noble and ftately buildings; *viz.* the temples of Apollo, Diana, and Latona, and alfo thofe of Neptune and Hercules; the porticoes of Philip of Macedon, and of Dionyfius Eutyches: a gymnafium, an oval bafon, about 48 toifes in diameter, made at an immenfe expence, for teaching the inhabitants to fwim, and for the exhibition of fea-fights; and a magnificent theatre of white marble, 250 feet in diameter; and a citadel.

Delos, or Deli, in *Geography*, an ifland of the Grecian Archipelago, formerly famous, as we have feen in the preceding article, is now little more than a defert rock, covered with ruins and uninhabited. Under the plural name Deli, are comprehended two iflands, *viz.* Little Delos, 7 miles in compafs, and Great Delos, which is included within a circuit of 18 miles, known to the ancients by the name of Rhenæa, which at fome diftance feems to be joined to Delos. It is now the refuge of pirates. Every where, fays Olivier, fchiftous or granitical, it exhibits no trace of a volcano, and nothing that can explain, by the laws of phyfics, the wonders which the Greeks have tranfmitted to us refpecting it; near it is mount *Cynthus;* which fee.

DELPHI, or Delphos, now called *Caftri*, the capital of Phocis, in Greece, fituated in a valley towards the S.W. of the foot of one of the brows of mount Parnaffus, fo famous in antiquity and facred to the Mufes and Apollo; and anciently much celebrated for its temple and oracle of Apollo. It was alfo called *Pytho*, particularly by the poets; deriving this name, as fome have faid, from the ferpent Python, which Apollo killed in this place. Paufanias, however, fays that this name Pytho was given to the city of Delphos, by Pythis, fon of Delphus, and grandfon of Lycorus. The Greek hiftorians give to this city the name of Delphos, which fome fuppofe to have been fo called from ἀδελφοι, brethren, becaufe Apollo and his brother Bacchus were both worfhipped there; and others, with greater probability, derive the name from δελφος, fingle, or folitary, referring to the retired fituation of the city among the mountains. Delphos was only 7 ftadia in circuit, and the rocks that encompaffed it formed its natural fortifications. One of the fummits of Parnaffus covered it on the north; another craggy rock, called "Cirphis," defended it on the fouth. Juftin queries, which was moft worthy of admiration, the fortification of the place, or the majefty of the god, who here delivered his oracles. "Incertum, utrum loci, an majeftas dei plus hic admirationis habeat." This city was built in the form of a kind of amphitheatre, and was divided into three parts, one rifing, as it were, above the other. Strabo places Delphos in the middle of Greece, and fome of the ancients conceiving it to be in the middle of the world, called it the navel of the earth; the poets pretending that Jupiter, in order to afcertain the middle of the earth, let fly two eagles; or according to Pindar, two crows, the one from the eaft and the other from the weft, and that they met in this place. It had, however, fo convenient a harbour, and was fo well fituated, being rather in the heart of Greece than of the world, that it became in time the place where the Grecian ftates affembled, and where the court of the Amphictyons fat. At prefent the town of Caftri does not confift of above 200 houfes, and thofe very ill built. It ftands between Salene and Livadia, about 10 miles diftant from the latter, on the fouth fide of mount Parnaffus. The temple of Apollo occupied, according to Paufanias, a large fpace, and many ftreets met here. The firft difcovery of the oracle, which laid the foundation of the extraordinary veneration in which this place was held, and of the riches accumulated in the temple, is faid to have been as follows: it was occafioned by fome goats which were feeding on mount Parnaffus, near a deep and large cavern, with a narrow entrance. Thefe goats having been obferved by the goat-herd, called Coretas by Plutarch, to frifk and leap after a ftrange manner, and to utter unufual founds immediately upon their approach to the mouth of the cavern, he had the curiofity to view it, and found himfelf feized with the like fit of madnefs, fkipping, dancing, and foretelling things to come. At the news of this difcovery, multitudes flocked thither, many of whom were poffeffed with fuch phrenetic enthufiafm, that they threw themfelves headlong into the opening of the cavern; infomuch, that it was neceffary to iffue an edict, forbidding all perfons to approach the cavern. This furprifing place was treated with fingular veneration, and foon covered with a kind of chapel, which Paufanias tells us was originally made of laurel boughs, and refembled a large hut. This, if we may credit the Phocian tradition, was furrounded by one of wax, and raifed up by the bees. After this a third was built of folid copper, faid to have been the workmanfhip of Vulcan. This laft was deftroyed, as fome fay, by an earthquake, or, according to others, by a fire, which melted the copper; and then a fumptuous temple, altogether of ftone, was erected by Trophimus and Agamedes, two excellent architects. This edifice was deftroyed by fire in the 58th Olympiad, 548 years B. C. The Amphictyons propofed to be at the charge of building another; but the Alcmeonides, a rich family of Athens, came to Delphos, obtained the honour of executing the building, and made it more magnificent than they had at firft propofed. The riches of this temple, amaffed by the donations of thofe who frequented it and confulted the oracle, expofed it to various depredations. At length the Gauls, under the conduct of Brennus, came hither for the fame purpofe, about 278 years B. C.; but they were repulfed with great flaughter. Laft of all, Nero robbed it of 500 of the moft precious ftatues.

It has not been afcertained at what time this oracle was founded. It is certain, however, that Apollo was not the firft who was confulted here. Æfchylus, in his tragedy of the Eumenides, fays, Terra was the firft who iffued oracles at Delphi: after her Themis, then Phœbe, another daughter of Terra, and, as it is faid, mother of Latona, and grandmother to Apollo. Paufanias fays, that before Themis, Terra and Neptune had delivered oracles in this place, and fome fay that Saturn had alfo been confulted here. At length the oracle of Apollo became eftablifhed and

and permanent; and fuch was its reputation, and fuch were the multitudes from all parts that came to confult it, that the riches which were thus brought into the temple and city became fo confiderable as to be compared with thofe of the Perfian kings. About the time when this oracle was firft difcovered, the whole myftery requifite for obtaining the prophetic gift was to approach the cavern and inhale the vapour that iffued from it; and then the god infpired all perfons indifferently; but at length feveral enthufiafts, in the excefs of their fury, having thrown themfelves headlong into the cavern, it was thought expedient to contrive a prevention of this accident, which frequently occurred. Accordingly, they placed over the hole, whence the vapour iffued, a machine which they called "a tripod," becaufe it had three feet, and commiffioned a woman to feat herfelf in this fort of chair, where fhe might imbibe the vapour without danger, becaufe the three feet of the machine ftood firmly upon the rock. This prieftefs was named "Pythia," from the ferpent Python, flain by Apollo, or from the Greek πυθεσθαι, fignifying to inquire, becaufe people came to Delphi to confult this deity. The females firft employed were virgins felected with great precaution; but the only qualification neceffary was to be able to fpeak and repeat what the god dictated. The cuftom of choofing young virgins continued for a long time, till one of them, who was extremely beautiful, was difhonoured by a young Theffalian. An exprefs law was then enacted, that none fhould be chofen but women above 50 years old. At firft there was only one prieftefs; but afterwards, there were two or three. The oracles were not delivered every day; but facrifices were in fome cafes prefented for a long time, and even for a whole year; and it was once a year in the month βοσιον, which anfwered to the beginning of fpring, that Apollo infpired the prieftefs. Except on this day, fhe was forbidden, under pain of death, to go into the fanctuary to confult Apollo. Alexander, before his expedition into Afia, came to Delphi on one of thofe days when the fanctuary was fhut, and intreated the prieftefs to mount the tripod, which fhe fteadily refufed, alleging the law which forbade her. The prince, naturally impetuous, became impatient, and drew the prieftefs by force from her cell, and whilft he was conducting her to the fanctuary, fhe took occafion to exclaim, "My fon, thou art invincible." As foon as thefe words were pronounced, Alexander cried out that he was fatisfied, and would have no other oracle. Great preparations were made for giving myfterioufnefs to the oracle, and for commanding the refpect that was paid to it. Among other circumftances relating to the facrifices that were offered, we may obferve that the prieftefs herfelf fafted three days, and before fhe afcended the tripod, fhe bathed herfelf in the fountain of Caftalia. She drank water from that fountain, and chewed laurel-leaves gathered near it. She was then led into the fanctuary by the priefts, who placed her upon the tripod. As foon as fhe began to be agitated by the divine exhalation, her hair ftood on end, her afpect became wild and ghaftly, her mouth began to foam, and her whole body was fuddenly feized with violent tremblings. In this condition fhe attempted to efcape from the prophets, who detained her by force, while her fhrieks and howlings made the whole temple to refound, and filled the by-ftanders with a facred horror. At length, unable to refift the impulfe of the god, fhe furrendered herfelf to him, and at certain intervals uttered from the bottom of her ftomach, or rather from her belly, according to the expreffion εγγαστριμυθος, fome unconnected words, which the prophets ranged in order, and put in form of verfe, giving them a connection which they had not when they were delivered by the prieftefs. The oracle being pronounced, fhe was taken off the tripod, and conducted back to her cell, where fhe continued feveral days to recover herfelf from her conflict. Lucan tells us, (Pharfal. lib. v.) that fpeedy death was frequently the confequence of her enthufiafm. The oracles pronounced by the prieftefs were generally delivered to the poets who attended on the occafion, and who put them into wretched verfe, which gave occafion to the raillery, that Apollo the prince of the mufes was the worft of poets. Sometimes the prieftefs herfelf pronounced her oracles in verfe; but in later times they contented themfelves with delivering them in profe; and this Plutarch reckons to have been one caufe of the declenfion of the oracle. The general characteriftic of this as well as other oracles was obfcurity and ambiguity; fo that the fame anfwer might be differently interpreted and applied; though it has been faid that the anfwers of this oracle were more plain and determinate than thofe of fome others. Thefe, however, were on many occafions equivocal. Thus, when Crœfus was about to invade the Medes, he confulted this oracle upon the fuccefs of the war, and received for anfwer, that by paffing the river Halys, he would win a great empire. But he was left to conjecture, or to determine by the event, whether this empire was his own or that of his enemies. Such was alfo the fame oracle's anfwer to Pyrrhus,

"Aio te, Æacida, Romanos vincere poffe."

Under the cover of fuch ambiguities, the god eluded all difficulties, and was never in the wrong. The priefts and priefteffes, to whofe conduct the refponfes of the oracle were committed, were frequently guilty of fraud and impofture. Many inftances might be mentioned; the Delphic prieftefs was not fuperior to corruption. Hence fhe perfuaded the Lacedæmonians to affift the people of Athens in the expulfion of the 30 tyrants. Hence alfo fhe caufed Demaratus to be divefted of the royal dignity to make way for Cleomenes; and fupported the impoftor Lyfander, when he endeavoured to change the fucceffion to the throne of Sparta. It is not improbable, that Themiftocles, who well knew the importance of acting againft the Perfians by fea, infpired the god with the anfwer he gave, "to defend themfelves with walls of wood." Demofthenes, convinced that the oracles were frequently fuggefted by paffion or intereft, and fufpecting, with reafon, that Philip had inftructed them to fpeak in his favour, boldly declared, that the Pythia *philippized*, and bad the Athenians and Thebans remember, that Pericles and Epaminondas, inftead of liftening to, and amufing themfelves with, the frivolous anfwers of the oracle, thofe idle bugbears of the bafe and cowardly, confulted only reafon in the choice and execution of their meafures. See ORACLE.

DELPHIN, in *Literary Hiftory*. See DAUPHINS.

DELPHINIA, in *Antiquity*, feafts which the inhabitants of Egina celebrated in honour of Apollo, furnamed Delphinius, fo called, as it is pretended, becaufe he affumed the form of a dolphin to conduct Caftalius and his colony from the ifle of Crete to the *Sinus Criffæus Delphinium*, one of the courts of judicature of the Athenians; fo called from the proximity of the place, where they held their affemblies, to the temple of Apollo Delphinius.

DELPHINIUM, in *Botany*, (Δελφινιον of the ancient Greeks, "becaufe," fays Diofcorides, "the flender fegments of its leaves refemble dolphins;" a refemblance rather to be found, according to the vulgar idea of that fifh, between the curvature of its body and the horned nectary of the flower; and Dodonæus fuggefts, on good authority, that the paffage is fo to be underftood.) Linn. Gen. 274. Schreb. 367. Willd. Sp. Pl. v. 2. 1226. Juff. 234. Gærtn. t. 65. Clafs and

and order, *Polyandria Trigynia*. Nat. Ord. *Ranunculaceæ*, Juss. *Multisiliquæ*, Linn. Larkspur.

Gen. Ch. *Cal.* none, unless we, with Jussieu, take the petals for such. *Cor.* Petals five, unequal, placed in a circle, of which the upper one is extended at the base into a long, straight, blunt, tubular spur: the two lateral ones are broadest, and the two lowermost least of all. Nectary of two leaves, combined or distinct; its fore part surrounded by the petals; its tubular spur enclosed in that of the uppermost petal. *Stam.* Filaments numerous, 15—30, small, awl-shaped, dilated at the base, ascending towards the upper petal. Anthers erect, roundish, two lobed, small. *Pist.* Germens three or one, ovate-oblong. Styles short. Stigmas obtuse, reflexed. *Peric.* Capsules equal in number to the germens, cylindrical, straight, of one valve and one cell, bursting longitudinally along their inner edge. *Seeds* several, roundish, angular.

Eff. Ch. Calyx none. Petals five; the upper one spurred. Nectary cloven, with a posterior spur.

The lower leaves are digitate or palmate; the upper sometimes undivided. Flowers loosely spiked or panicled, terminal, various in colour, but never yellow. Juss.

Nine species of Larkspur are enumerated in the 14th edition of Linn. Syst. Veg. published by Murray, fourteen in Willdenow.

* *Capsules solitary.*

D. *Consolida*, Sm. Fl. Brit. 577. Engl. Bot. t. 1839; "Capsule solitary. Nectary of one leaf. Stem subdivided;" is one of the annual species, abundant in the open fields of Cambridgeshire, &c. and known in gardens by the name of Branching Larkspur. Its Latin denomination arose from a mistaken opinion of its healing or consolidating virtues. The reverse would be nearer the truth, its juices being, like those of many kinds of *Ranunculus*, *Anemone*, and *Clematis*, so acrid as more or less to blister the skin. The flowers, naturally of a brilliant though deep blue, and forming with alum a blue pigment, are occasionally white, pink, or elegantly variegated with pink and blue. D. *Ajacis*; "Capsule solitary. Nectary of one leaf. Stem simple;" is the more common Garden Larkspur, so frequently double and so various in colour. Upon what foundation Linnæus and others have taken this for the hyacinth of the poets does not appear. The late professor Martyn, and his son, the learned editor of Miller, contend, with great probability, that *Lilium Martagon* was the plant intended, on account of the letter-like marks on its petals, and professor Heyne assents to this opinion. See Hyacinthus, Lilium, and Scilla. D. *aconiti*; Linn. Mant. 77. Vahl. Symb. v. 1. t. 13; "Capsule solitary. Nectary of one leaf, with four teeth in front. Ultimate branches single-flowered." A very remarkable species on account of its minute petals and large nectary, found by Tournefort and Forskall in the Levant, was referred by the latter to *Aconitum*.

** *Capsules Three to each Flower.*

Of this section the most remarkable are, D. *grandiflorum*, Mill. Ic. t. 250. f. 1.; Nectary two-leaved, with an undivided lip. Leaves in numerous linear acute segments. Root perennial. Flowers very large, of a rich deep blue. Capsules hoary. A native of Siberia, one of the finest of its genus. D. *elatum*, the common Bee Larkspur, and D. *exaltatum*, the brilliant American Larkspur, are both hardy perennials, frequent in our gardens, which may be made to blossom twice in one season if cut down close to the root after their first flowering. D. *Staphisagria*, Stavesacre, Woodv. Med. Bot. t. 154, a native of the South of Europe, though a flower of great beauty, is chiefly known for its seeds as a vulgar remedy to expel lice. It is a biennial, rather difficult of culture.

Delphinium, in *Gardening*, comprises plants of the herbaceous, flowery, hardy, annual, and perennial kinds; of which the species mostly cultivated are the upright lark-spur (D. *ajacis*), the great-flowered bee lark-spur (D. *grandiflorum*), and the tall bee lark-spur (D. *elatum*): Of which the first is annual, and has the stalks eighteen inches and more in height, seldom branched; the leaves are finely divided, commonly by threes, on broad petioles; the segments are linear, quite entire, and channelled above; the spikes of flowers erect, dense, and of different colours.

There are varieties with single and double blue flowers; with single and double purple flowers; with single and double silver-coloured flowers; with single and double violet-coloured flowers; with single and double ash-coloured flowers; with single and double striped flowers; large rocket lark-spur, and dwarf or rocket lark-spur.

The second sort has a perennial root, which puts out two or three branching stalks every spring, rising about a foot and a half high; the leaves are smooth and of a light green colour above, and hoary beneath, composed of many narrow segments, which terminate in several acute points; the flowers come out towards the upper part of the stalks singly, each on a long naked peduncle, are large, and of a fine azure colour. They appear in June and July, and the plant is a native of Siberia.

The last sort rises to the height of from five to six feet; the root is perennial; the leaves slightly villose, becoming smooth by age, half-five-lobed, petioled; lobes acute, often half-three-lobed, sharply serrate. The spikes of flowers very long and handsome, of a deep blue colour, with a wrinkled spur. It is a native of Switzerland, &c. flowering from June to September.

Method of Culture.—These plants, in all the sorts and varieties, are propagated by sowing the seeds in the early spring, as in February, March, and the following month, or in the autumn, immediately after the seeds become ripe, in the clumps, borders, or other places where the plants are to remain, as they do not succeed so perfectly by transplanting, in patches of eight or ten in a place, covering the seed into the depth of nearly half an inch, the mould being previously rendered fine.

Where the annual sort and varieties are cultivated for a large show, the seed may be sown thinly in drills on beds four feet broad, at a foot distance, covering it into the above depth. They are sometimes sown in other forms, for the purpose of appearance.

The autumn sowings of these seeds should be marked, by placing small sticks in the places, to prevent their being disturbed by the spring digging of the ground.

The only culture the plants in general require after they appear, is that of thinning them in a proper manner, according to circumstances, and keeping them free from weeds. And in the perennial sorts, removing the stems in the autumn.

These plants afford much ornament and variety in the different compartments of pleasure-grounds, and they succeed in most soils and situations, being of hardy growth.

Delphinium, in *Ancient Geography*, a maritime town of the isle of Chios, situated eastward, and towards the middle of the island. It was taken by Callicratides, commander of the Lacedæmonians towards the second year of the 93d olympiad, 407 years B. C.

DELPHINUS, the *Dolphin*, in *Astronomy*, a constella-

tion

tion of the northern hemifphere ; whofe ftars, according to Ptolemy, are 10 ; according to Tycho, as many ; according to Hevelius, 14; and, according to Mr. Flamfteed, 18.

Delphinus, in *Zoology*, the laft genus of the cetaceous or fifh-formed tribe of mammalia, the character of which confifts fimply in having teeth in each jaw. By this means, it is at once diftinguifhed from the whale tribe, which have no teeth in either jaw, from the monodon, which have them only in the upper jaw, and the phyfeter, in which they occur only in the lower one. Thefe are the four genera of cetaceous animals. The fpecies of the delphinus genus, four in number, are defined as follows.

Phocæna. Body fub-conic, back broad, fnout bluntifh. Linn. Fn. Suec. *Turfio*, Pliny. *Meerfchwein oder tunin*, Mart. *Nifer ou le marfouin*, Egede. Porpoife, or Porpeffe.

The upper part of the body in this kind is blueifh black, and the lower white ; the head obtufe, with fmall eyes and teeth (the latter of which are acute), and the vent fomewhat bilobate. The porpeffe inhabits the European feas, and not unfrequently in warm feafons afcends the entrance of large rivers, in purfuit of the fhoals of fifhes, which are proceeding in their migratory courfe from the fea to the frefh waters. The porpeffe lives chiefly on the fmaller kinds of fifh, and is obferved, when in queft of food, to turn up the fand and mud at the bottom of the water like the hog : it is often feen, likewife, darting and tumbling over in the water like the dolphin, and this uneafinefs of the animal, in the opinion of fome, is to be regarded as the prefage of ftormy weather.

Porpeffes are obferved to affemble occafionally in vaft numbers, and to purfue fhoals of herrings, mackarel, and other fifh, which they drive into the bays and clofe receffes, and prey upon with great voracity. This animal is remarkably fat, and being covered immediately under the fkin with a very thick coat of lard, affords an abundance of oil. The porpeffe was once confidered as a fumptuous article of food in this country, and was oftentimes introduced to the tables of the Englifh nobility, even fo lately as the reign of queen Elizabeth. It was eaten with a fauce compofed of the crumbs of fine bread with fugar and vinegar. In the prefent day, the porpeffe is an object of capture only for the fake of its oil.

Delphinus. Body oblong, roundifh ; fnout narrow and fharp. Artedi. *Delphinus*, Pliny. *Porcus marinus*, Sibbald. *Delphin*, Crantz. Dolphin.

The dolphin bears a great refemblance to the porpeffe, but has a fnout more elongated and acute, and the fhape of the body throughout is rather more flender ; and it alfo grows to a much larger fize, the porpeffe feldom exceeding three or four feet, and the dolphin meafuring in common eight or ten feet ; the colour is rather fimilar in both. The dolphin is found in the Mediterranean and Indian feas, and feems to be generally confounded by navigators with the former. It preys on various kinds of fifh, and is faid to be fometimes feen attacking and wounding even the larger kinds of whales. The feamen confider its appearance as the prelude of an approaching ftorm.

The celebrity which the dolphin obtained among the ancients, from its fuppofed attachment towards the human race, is fufficiently known. "The dolphin," fays Pliny, "is friendly to man, and pleafed with mufic. He does not fly from the fight of mankind, but of his own accord meets their fhips, gamboling before them, and accompanying their courfe, as if through a fpirit of emulation, and always outftripping them, even when failing with the moft favourable wind." The voice of the dolphin, according to the fame writer, is a found refembling a human groan. Thefe and other particulars related by poets and hiftorians of antiquity, have excited fentiments of veneration in vulgar minds towards this uncouth inhabitant of the waters : as poetic allegories, thofe tales are not difpleafing ; but as matters of fact are altogether difcountenanced by the obfervations of later writers.

From the teftimony of Gronovius, it appears, that the porpeffe conftantly fwims in an incurvated pofture ; and this very naturally leads to a conclufion that the dolphin, whofe form is ftrikingly fimilar, may fwim in the fame pofition ; a circumftance tending to prove that the reprefentations of the dolphin, tranfmitted to us by the ancients, are not fo greatly exaggerated as might otherwife be imagined.

Orca. Snout turning upward ; teeth obtufe. *Delphinus orca, roftro furfum repando, dentibus latis ferratis*, Linn. Mant. *Orca*, Pliny. *Butfkopf*, Marten. *Buts-kopper*, Egede. Grampus.

This animal grows to the length of twenty-five feet, and is of an extremely fierce and predatory difpofition, feeding on larger fifhes, and even on the dolphin and the porpeffe. It is found in the Mediterranean and Atlantic feas, as well as in both the polar regions. This fpecies often attacks the whales, whence Fabricius denominates it *balænarum tyrannus*. Seals are its more common food ; thefe it frequently furprifes while fleeping on the rocks, diflodging them by means of its back fin, and, having precipitated them into the water, feizes upon and devours them without difficulty.

Leucas. Snout conic, obtufe, and inclining upwards ; no dorfal fin. Pallas. *Beluga*, Penn. *Bieluga*, Steller. *Wittfifch oder Weiffifch*, Anderfon. *Weiffifch*, Crantz.

A native of the arctic regions, defcribed by Fabricius, Pallas, and other late writers, for it does not appear to have been diftinctly known till within a few years. Its form is not inelegant, and its colour, when full grown, milk-white, or white, tinged with pale rofy. The fpecies is gregarious, and is often obferved fwimming in large fhoals, the young accompanying the parents, and the whole, from their unufual colour, forming an interefting fpectacle. The head of this fpecies is rather fmall, and has the fpiracle at the fummit ; the eyes very fmall and blueifh ; the gape moderate ; the teeth fmall, blunt, and not very numerous, amounting to about ten on each fide in both jaws. The neck is fhort, and the body thickeft in the middle. The tail is flightly lobed, the pectoral fins thick and fatty, and are marked at the edge into five flight divifions : thefe contain the bones of the five fingers which may eafily be felt within the fin. The fkin, on every part, is fmooth and flippery, and the animal in general very fat.

According to Pallas, when this animal fwims, the tail is bent inwards, in the manner of the craw-fifh, and is enabled to move in the water with amazing velocity by the alternate incurvation and extenfion of that part. It bears fuch a ftrong affinity with the feals, that the Samoieds confider it as a kind of aquatic quadruped. This animal produces only one at a birth ; this is at firft blueifh, grey, or inclining to blackifh, and acquires the pure and beautiful milky white appearance of the parent as it advances in age.

DELPHOS. See Delphi.

DEL-REY, in *Geography*, a captainfhip, or province, in the fouthern part of Brazil ; which feems to be rather regarded as a frontier diftrict towards the Spanifh poffeffions, than as a regular fettlement.

DELRIO, Martin-Anthony, in *Biography*, a learned Jefuit, born at Antwerp in the year 1551. Having attained to

to a competent knowledge of the claffics, he went to Paris to be inftructed by able profeffors in rhetoric and philofophy. From Paris he proceeded to Douay and Louvain to ftudy the law, and thence he travelled to Spain, where, in 1574, he had the degree of doctor conferred on him by the univerfity of Salamanca. On his return into the Low Countries he filled fome civil offices of honour and emolument; but upon the breaking out of the wars in Flanders, he took another journey into Spain, when he entered himfelf among the Jefuits at Valladolid, in the year 1580. In a few years he was ordered by his fuperiors into the Low Countries, to teach philofophy, the languages, and theology. At Louvain he contracted an intimacy with the celebrated Juftus Lipfius. Here he died in October 1608. As an author he is chiefly known by his "Difquifitiones Magicæ," in three vols. 4to. publifhed in 1599 and 1601. He publifhed likewife commentaries on various parts of the Old and New Teftaments; and treatifes in defence of the genuinenefs of the books attributed to Dionyfius, the Areopagite, againft the criticifms of Scaliger. In the early part of life he publifhed notes on Claudian, on the tragedies of Seneca, together with fome treatifes on law. Moreri.

DEL SPIRITU SANTO, in *Geography*, a river which falls into the gulf of Mexico, at the N. W. end of the peninfula of Florida.

DELTA, the name given to a confiderable part of Lower Egypt, on account of its triangular figure, which refembles the Greek *delta*, Δ. The triangle which formed the delta was anciently comprifed between two branches of the Nile, and the Mediterranean fea. At fome diftance to the north of Memphis, or at a place where formerly ftood the town of "Cercefura," now called "Batn el Bakara," or the cow's belly, the Nile feparated into two principal branches, *viz.* the Canopic branch to the weft, which falls into the fea near Rofetta, and the Pelufian to the eaft, which difcharges itfelf into the fea near Damieta. The former of thefe branches taking a north and north-weft courfe, bore the name of "Agathosdæmon flumen," or the river of the good genius; and terminated to the eaft of Canopus, after having watered Schedia, which was fituated at the mouth called "Canopicum Oftium." The latter branch, whofe courfe was north-eaft, was called "Athribiticus fluvius," becaufe it watered the town of "Athribis," and difcharged itfelf into the fea, near Pelufium, at the mouth denominated "Pelufiacum Oftium." The fpace comprehended between thefe two branches was divided into two others; one called Delta, which comprifed the territory between the Agathofdæmon and the continuation of the Athribiticus, paffing by Xoïs, Bufiris, &c. to Thumiathis, where was the mouth called "Phatmeticum Oftium." The other part, comprehended between this branch and that which turned towards the eaft from the north of Athribis as far as Pelufium, was called "Delta parvus." The firft of thefe Deltas contained the towns of Profopitis, Taula, Saïs, Bufiris, Xoïs, Sebenythus, Onuphis, Pachnamunis, Butus, and Metelis, which gave name to as many different nomes, befides other confiderable towns; the Parvus Delta contained the towns of Leontopolis, Mendes, Panephyfis, Tanis, and Sethrum, together with fome others which were not the capitals of nomes. Confidering, fays major Rennell in his "Geographical Syftem of Herodotus examined and explained," the extreme flatnefs of the Delta; the quality of its foil which is totally different from that of the adjacent countries; its form which projects fo far into the fea, beyond the general line of the coaft, on the one hand, and on the other, filling up a fpace which, reafoning from appearances, looks like a bay or gulf of the fea: one can hardly doubt, that the fpace which it occupies was originally a part of the fea, from the neighbourhood of Pelufium, or of mount Cafius, to that of Alexandria; and fouthward to the foot of the hills of the pyramids, and of Mokattam; which is allowing little more for the depth of the bay, from the fuppofed line of the coaft, than the lower point of the Delta now advances beyond it. Without doubt when we carry back our ideas to the time when the fea wafhed the bafe of the rock, on which the pyramids of Memphis ftand, the prefent bafe of which is wafhed by the inundation of the Nile, at an elevation moft probably of 70 or 80 feet above the furface of the fame fea; we are loft in the contemplation of the vaft interval of time that muft neceffarily have elapfed fince the foundation of the Delta was firft laid. To the natural progrefs of alluvion, the depofitions acquire a mafs capable of feparating the parent river into different channels, by an apex; while, the fides fpreading wider as they recede from this point, the newly emerged land affumes a triangular form. Its bafe gradually enlarges by new depofitions; the mafs, as it acquires a firmer confiftence, confines the river to fewer channels; and the apex of the Delta changes its pofition by receding farther from the fource. In this way M. Rennell ftates grounds for fuppofing that the apex of the Delta of Egypt was once fituated to the fouthward of the fite of Memphis: and he produces lefs equivocal teftimony of a change of pofition towards the north, in times pofterior to that diftant and doubtful era. The fite of the centre of ancient Memphis is placed by Mr. Rennell in 29° 53′. The Canopic, or moft weftern branch of the Nile, is fuppofed to have gradually forfaken its bed, and to occupy the Bolbitine channel, which was originally an artificial one. By this change, the Delta has been contracted about 18 miles of the weftern part of its bafe; and this is become as barren a defert as the adjoining one of Libya. The opinion above ftated, that the Delta has been formed by the accumulation of flime or foil in confequence of the periodical inundations of the Nile, is now very generally received by naturalifts; though it is liable to fome very ftrong objections from chronology, which are not eafily folved. If the fea ever wafhed the rock on which the pyramids ftand, it muft have been at a period much anterior to the building of Memphis by Menes; fince the gradual depofition of the river had even then produced the Delta. Yet Menes muft have lived only a few centuries fubfequent to the flood. Another phyfical objection occurs of ftill greater weight. There was a time when the rock of the pyramids was nearly on a level with the fea; it is now 80 feet above that level, not by the retroceffion of that element, but by the acceffion of height gained by the land in confequence of the depofitions of the Nile, according to the opinion above ftated. Let us fuppofe, then, that when the city of Memphis and the pyramids were founded, the fite was 40 feet above the level of the fea; in this cafe, Memphis, the pyramids, and of courfe, many of the cities of ancient Egypt, would now be 40 feet under ground;—a fuppofition not warranted by fact. In the time of Moeris, who is faid to have lived 500 years before the Trojan war, the Delta appeared in its infancy. Eight cubits were then fufficient to overflow it in its whole extent. Boats paffed over it from one extremity to the other, and its towns, built on artificial elevations, refembled the iflands of the Ægean fea. (Herodotus, Euterpe. Strabo, lib. xvii.) When Herodotus vifited Egypt, 15 cubits were neceffary to cover all the Lower Egypt, but the Nile then overflowed the country for the fpace of two days' journey, to the right and left of the Delta. Under the Roman empire, 15 cubits produced the fame effect. In the time of the domination of the Arabs, their writers fpeak of 17 cubits as the moft favourable height. Eighteen cubits are at this time

time the meafure of abundance; but the inundation no longer extends over the Lower Egypt, but its progrefs is ftopped at Grand Cairo, and in the neighbouring country. The Nile, however, fometimes rifes to 22 cubits. The mud accumulated for fo many years on the ifland, which arofe from out of its bofom, is the caufe of this phenomenon. Art has alfo contributed towards it, either by the banks raifed to protect the lands moft expofed to the action of the river, or by multiplying its outlets, and by cutting a great number of canals, which give a free paffage to the waters. The Delta, which is ninety leagues in circumference, is at prefent in the moft favourable ftate for agriculture. Wafhed on the eaft and weft by two rivers formed by the divifion of the Nile, and interfected by innumerable rivulets, it prefents to the eye an immenfe garden, all the different compartments of which may be eafily watered. During the three months that the Thebais is under water, the Delta poffeffes fields covered with rice, barley, vegetables, and winter fruits. It is no longer, as in former times, the Ægean fea with the Cyclades; rich harvefts now cover an extenfive plain; it is now overfpread with groves of date-trees, of oranges, and fycamores; here are perpetually running ftreams, and a verdure that is conftantly varied and renewed; it is, in fhort, fays M. Savary, (Letters on Egypt, vol. i.) a picture of abundance, that delights the eye, and aftonifhes the imagination. By lofing the inundation, this ifle has gained every year, the three months during which the Thebais is under water. It is alfo the only part of Egypt, where the fame field produces two crops of grain within the year, one of rice, the other of barley. The length of the Delta, as well as its height, has increafed. (Strabo. lib. xvii.) Under the reign of Pfammetichus, the Milefians, with 30 veffels, landed at the mouth of the Bolbitine branch, now called that of Rofetta, where they fortified themfelves. They there built a town called "Metelis," the fame as Faoüe. This town, formerly a fea-port, is at prefent 9 leagues diftant from it, and this is the fpace by which the Delta has lengthened, from the time of Pfammetichus to our day. Moreover, the new town of Alexandria is at fome diftance to the north of the ruins of the old town, and the fea has retired. (See ALEXANDRIA and PHAROS.)

Some Arabs divide the Delta into two parts "Al Rif," and "Al Bahriya;" the former, being the weftern part, is fuppofed by Bochart to be the Rahab of the Scriptures, and was fo called becaufe of its form, refembling a pear; which the Egyptians call Rib, or Ribi. Al Bahriya is the eaftern part of the Delta, in the opinion of many; though Sieard more truly places Al Bahriya, or as he writes it, Beheiré, beyond the weftern branch of the Nile. Delta, as Savary informs us, is divided into two provinces, in which two Beys refide. Menouf is the capital of the Upper, and Mehallé el Kebire of the lower province; the former is called Menoufié, and the latter Garbie.

DELTA, a town of Egypt, in the greater Delta, according to Ptolemy.—Alfo, a name given to a quarter of Alexandria.

DELTA *of the Ganges*, that part of the province of Bengal which lies near the mouth of the Ganges, commencing about 220 miles from the fea, or 300 by the windings of the river, and comprehending confiderably more than twice the area of that of the Nile.

The two wefternmoft branches, named the Coffimbuzar and Jellinghy rivers, unite, and form what is afterwards called the Hoogly river; which forms the port of Calcutta, and the only branch of the Ganges that is commonly navigated by fhips. That part of the Delta, which borders on the fea, is compofed of a labyrinth of rivers and creeks, all of which are falt except thofe that immediately communicate with the principal arm of the Ganges. This tract, known by the name of the "Woods," or "Sunderbunds," is in extent equal to the principality of Wales; and is fo completely inveloped in woods, and infefted with tigers, that if any attempts have ever been made to clear it, they have hitherto mifcarried. Its numerous canals are fo difpofed as to form a complete inland navigation throughout and acrofs the lower part of the Delta; without either the delay of going round the head of it, or the hazard of putting to fea. Here falt, fufficient for the whole confumption of Bengal and its dependencies, is made and tranfported with equal facility; and here is alfo formed an inexhauftible ftore of timber for boat-building. The breadth of the lower part of this Delta is upwards of 180 miles; to which, if we add that of the two branches of the river that bound it, we fhall have about 200 miles for the diftance to which the Ganges expands its branches at its junction with the fea. In tracing the fea-coaft of the Delta, there are found no lefs than eight openings; each of which, without hefitation, one pronounces to have been in its time the principal mouth of the Ganges. Nor is the occafional deviation of the principal branch, probably, the only caufe of fluctuation in the dimenfions of the Delta. The deltas of moft capital rivers, the tropical ones efpecially, are obferved to encroach upon the fea. This circumftance is probably owing to the mud and fand brought down by the rivers, and gradually depofited, from the remoteft ages down to the prefent time. The rivers, it is known, are loaded with mud and fand at their entrance into the fea; and it is alfo known, that the fea recovers its tranfparency at the diftance of 20 leagues from the coaft; which muft be owing to the waters having precipitated their earthy particles within that fpace. As a ftrong prefumptive proof of the wandering of the Ganges from one fide of the Delta to the other, major Rennell obferves, that there is no appearance of *virgin* earth, between the Tiperah hills on the eaft, and the province of Burdwan on the weft; nor on the north till we arrive at Dacca and Bauleah. In all the fections of the numerous creeks and rivers in the Delta, nothing appears but fand and black mould in regular ftrata, till we arrive at the clay, that forms the lower part of their beds. There is not any fubftance fo coarfe as gravel, either in the Delta, or nearer the fea than 400 miles, at Oudanulla, where a rocky point, a part of the bafe of the neighbouring hills, projects into the river: but in places remote from the great rivers, the foil is either red, yellow, or of a deep brown. Rennell's Memoir, Phil. Tranf. vol. lxxi. p. 92, &c.

DELTA *of the Indus*, a part of the province of Sinde, formed by the mouths of the river Indus or Sinde, near its entrance into the fea, and projecting into the fea, inftead of receding from it. We learn from major Rennell, that during great part of the S.W. monfoon, or at leaft in the months of July, Auguft, and part of September, which is the rainy feafon in moft other parts of India, the atmofphere in the Delta of the Indus is generally clouded; but no rain falls, except very near the fea. Indeed, very few fhowers fall during the whole feafon.

The Ava or Pegue river forms likewife a delta of confiderable extent. Thus alfo the Kiftnah and Godavery rivers, however remote at their fountains, approach within 80 miles of each other, in the lower parts of their courfe; and form an extenfive tract of country, compofed of rich vegetable mould, fuch as is ufually found at the mouths of large rivers. By comparing this tract with the Deltas of Egypt and Bengal, and reafoning from analogy, it will be readily fuppofed, that the whole, or the greateft part of the territory included between Samulcotta and Pettapolly, about 150 miles in length

length along the fea-fhore, and from 40 to 50 wide, is in reality a gift of the two fore-mentioned rivers. The fame appearances may be obferved at the mouths of the Cattack and Tanjore rivers; but the Kiftnah and Godavery, by draining a much greater extent of country, that is, from the 15th to the 21ft degree of latitude, have collected materials for a greater quantity of new land. Within this new-formed land, and about mid-way between the Godavery and Kiftnah, the foil forms a hollow fpace, which in its loweft part is a lake at all feafons; and in all the other parts an extenfive inundation, during the feafon of the periodical rains; being then a lake of 40 or 50 miles in extent, and called the *Colair* Lake; which fee. For an account of a fimilar delta, fee Zambezi.

DELTHANII, in *Ancient Geography*, a town of the Peloponnefus, placed by Steph. Byz. between Laconia and Meffenia.

DELTOIDES, in *Anatomy*, one of the large mufcles of the arm, fo called becaufe its form is triangular, and therefore refembles that of the capital delta of the Greek alphabet; (from δελτα, and ειδος, *form*.) It is a thick and flefhy mufcle, forming the upper and outer part of the fhoulder; arifing by its broadeft portion, which correfponds to the bafe of the triangle, from the fcapula and clavicle, ftretching over the head of the humerus, and, after gradually contracting in breadth, ending by a pointed infertion into the humerus. Its origin takes place, by a mixture of tendinous and flefhy fibres, from the whole length of the inferior margin of the fpine of the fcapula; from the outer convex edge of the acromion; and from one-third of the anterior margin of the clavicle, in that part which is towards the fcapula. From thefe different points the fibres all defcend, and converge to one infertion; the pofterior portion paffes very obliquely forwards, the middle of the mufcle is firft bent over the head of the humerus, and then defcends in a ftraight courfe; and the anterior part proceeds obliquely backwards. The infertion takes place, by means of a ftrong tendon, more vifible on the inner than on the outer furface, into a large tuberofity fituated on the external, and rather above the middle part of the humerus. It extends about an inch and a half from above downwards, and is included by the bifurcation of the brachialis internus. The deltoid mufcle is covered on its external furface for the moft part by the fkin; but throughout a fmaller portion, near its upper and anterior part, by the latiffimus colli. On the infide it is in contact behind with the infra-fpinatus, teres minor, and the long head of the triceps near its origin; towards the middle, with the tendon of the fupra-fpinatus, the coraco-acromial ligament, the capfule of the fhoulder-joint, the upper part of the humerus, and the circumflex veffels and nerves; on the front, with the coracoid procefs of the fcapula, the tendon of the pectoralis minor, the biceps, coraco-brachialis, fub-fcapularis, and tendon of the pectoralis major. The cephalic vein of the arm lies along its anterior edge, being placed between it and the correfponding margin of the pectoralis major.

The fibres of the deltoid mufcle are arranged in large fafciculi, feparated from each other on the furface of the mufcle, and terminating in a pointed form below. Between the capfule of the humerus, the under furface of the acromion, and the deltoid, a large burfa mucofa is found, which becomes particularly neceffary here, on account of the friction created by the numerous and extenfive motions of the os humeri.

This mufcle will move the humerus or the fcapula, according as the one or the other of thefe parts is the moft moveable. The latter muft in the great majority of inftances be regarded as the fixed point. Suppofing the arm to hang by the fide of the body, the deltoid will raife it; either fo as to bring it to a right angle with the fide, or to carry it towards the front or back part of the trunk, according as the middle, the anterior or pofterior fibres are employed in the elevation. When the arm has been raifed, the clavicular fibres will carry it towards the fternum, and the fcapular fibres towards the back: the latter at the fame time deprefs the arm, if it has been carried upwards beyond the level of the fpine of the fcapula. When the arm is drawn up from the fide in the mid direction between the anterior and pofterior, the elevation begins by the middle fibres of the deltoid, for the anterior and pofterior portions then acting together would draw the arm ftill clofer to the fide; and either of thefe parts, being employed feparately, would incline the limb forwards or backwards. But, as the elevation proceeds, more and more of the fibres come into action; until at laft the whole mufcle is employed. In elevating the arm, the deltoid is affifted by the fupra-fpinatus mufcle, which fee. When the humerus is fixed, the deltoid will draw the fcapula towards that bone; and, as the latter part is united by various mufcles to the trunk of the body, the deltoid will concur in moving the trunk upon the upper limbs.

DELTOIDEUM Folium. See Leaf.

DELTOTON, a conftellation, the fame as the *Northern* Triangle, which fee.

DELUBRUM, in *Roman Antiquity*, a temple with a large fpace of confecrated ground round it. See Temple.

DELVE, in *Agriculture*, a term fometimes employed to fignify to dig with a fpade.

DELUGE, Diluvium, in *Natural Hiftory*, a flood, or inundation of water, covering the earth, either in the whole or part.

We meet with divers accounts of deluges in ancient hiftory, both facred and profane: that which happened in Greece, in the time of Deucalion, called diluvium Deucalioneum, is famous: this deluge only overflowed Theffaly. Its date is fixed to the year before Chrift 1529, being the third year before the Ifraelites' coming out of Egypt, according to the computation of Petavius, Rat. Temp. par. i. lib. i. cap. 7. or according to Blair's Tables, about 1503 years B. C. See Deucalion.

The deluge of Ogyges happened about 269 years before that of Deucalion, 1020 years before the firft Olympiad, and 1796 before Jefus Chrift, according to the fame author, Rat. Temp. par. i. lib. i. cap. 4. par. ii. lib. ii. cap. 5. or according to Blair, 1764 years B. C. (See Ogyges.) This only ravaged Attica.

Thefe two deluges are frequently mentioned, in ancient Greek authors, under the denomination of cataclyfmus prior and pofterior. Deucalion's flood in Theffaly, and alfo thofe of Ogyges in Attica, and of Prometheus in Egypt, have been thought the fame with that of Noah.

Of the like kind were the deluge in Syria, which, in 1095, drowned a prodigious number of people; a deluge in Friefland, which, in 1164, covered the whole environs of the coafts, and drowned feveral thoufands of the inhabitants; another inundation in 1218, which deftroyed 100,000 men; the inundations in the Netherlands, which, in 1727, overwhelmed and covered with fea all that part now called the Gulf Dollart, in the United Netherlands; and in 1421, all that part between Brabant and Holland.

But the moft memorable deluge is that which we particularly, by way of eminence, call the deluge, or the univerfal deluge, or Noah's flood; recorded in Scripture as a general inundation fent by God to punifh the corruption of the world,

world, at that time, by deftroying every thing (Noah and his family, and what was fhut up with him in the ark, only excepted) from the face of the earth.

This flood makes one of the moft confiderable epochas in chronology. Its hiftory is given by Mofes. Gen. ch. vi. and vii. Its time is fixed by the beft chronologers to the year from the creation 1656, anfwering to the year before Chrift 2348. On the 10th day of the fecond month, which was on Sunday November the 30th, God commanded Noah to enter into the ark with his family, &c.; and on Sunday December 7th, it began to rain, and rained 40 days, and the deluge continued 150 days. On Wednefday May 6th, B. C. 2348, the ark refted on mount Ararat. The tops of the mountains became vifible on Sunday July the 19th, and on Friday December the 18th, Noah came forth out of the ark with all that were with him; he built an altar and facrificed to God for his deliverance. (Blair's Chronology.) From this flood, the ftate of the world is divided into diluvian, or poftdiluvian, and antediluvian.

The account given by Mofes of this cataftrophe, is confirmed by the concurrent teftimonies of feveral of the moft ancient writers and nations in the world; and as the poffibility of it cannot be denied, we need not recur to the hypothefis of an ingenious biblical critic (fee Geddes's Crit. Rem. p. 72.) who fuggefts, "that a good deal of the fabulous is mixed with the hiftory of Noah's flood." Although the hiftory of this event has been varied, and modelled according to the notions and traditions that prevailed in different countries and different ages, yet the ground-work was always eftablifhed on the foundation of truth; and the event was for a long time univerfally commemorated. Jofephus, who feems to have been a perfon of extenfive knowledge, and well acquainted with the hiftories of nations, fays, that this great occurrence was to be met with in the writings of all perfons who treated of the firft ages. He mentions Berofus of Chaldæa, Hieronymus of Egypt, who wrote concerning the antiquities of Phœnicia; alfo Mnafeas, Abydenus, Melon, and Nicolaus Damafcenus, as writers, by whom it was recorded; and adds, that it was taken notice of by many others. From Berofus, a Chaldæan by birth, who lived in the time of Alexander the Great, we learn, that Chronus or Saturn appeared to Xifuthrus, the tenth or laft of the Chaldæan kings, in a dream, and warned him, that on the 15th of the month Defius, mankind would be deftroyed by a flood; he therefore commanded him to write down the original, intermediate ftate, and end of all things, and bury the writings under ground in Sippara, the city of the Sun; he likewife directed him to build a fhip, and go into it with his relations and deareft friends, having firft furnifhed it with provifions, and taken into it fowls and four-footed creatures; and told him, that when he had provided every thing, and was afked whither he was failing, he fhould anfwer, "to the Gods, to pray for happinefs to mankind." Xifuthrus accordingly built a veffel, whofe length was five furlongs, and breadth two furlongs. He put on board all that he was directed to provide, and went into it with his wife, children, and friends. The flood being come, and foon ceafing, Xifuthrus let out certain birds, which, finding no food nor place to reft upon, returned again to the fhip. After fome days he fent forth the birds again, but they came back to the fhip, having their feet daubed with mud; but when they were fent away the third time, they returned no more: a circumftance from which Xifuthrus underftood that the earth had appeared again. He now made an opening between the planks of the fhip, and feeing that it refted on a certain mountain, came out with his wife, his daughter, and his pilot; having worfhipped the earth, and raifed an altar, and facrificed to the gods, he, and thofe who went out with him, difappeared. They who were left behind in the fhip, finding Xifuthrus, and the perfons that accompanied him did not return, went out to feek for him, calling him aloud by his name; but Xifuthrus was no more feen by them; only a voice, iffuing from the clouds, enjoined them to be religious, declaring that Xifuthrus, on account of his piety, was gone to dwell with the gods; and that his wife, and daughter, and pilot, were partakers of the fame honour. It alfo directed them to return to Babylon, and taking the writings from Sippara, to communicate them to mankind; and finally told them, that the place where they were was the country of Armenia. Thus informed, they offered facrifices to the gods, and immediately repaired to Babylon, dug up the writings at Sippara, built many cities, raifed temples, and rebuilt Babylon. Abydenus alfo gives a fimilar relation. It is faid that Xifuthrus or Sifithrus, Ogyges, and Deucalion, are all names fignifying the fame thing in other languages, as Noah does in the Hebrew, in which Mofes wrote. (Vide Alexander. Polyhiftor. ex Berofo, apud Syncell. p. 30, 31. et apud Cyrill. contra Julian. l. 1. p. 8. Abydenus ex eodem, apud Syncell. p. 38, 39, et apud Eufeb. de Præp. Evang. l. ix. c. 12.) The Indians and Perfians had alfo traditions concerning the deluge. Accordingly, an eaftern writer tells us, that fome of thofe who embrace the Magian religion, are faid to deny the flood, or at leaft the univerfality of it; pretending that it reached no farther than a cliff near Hulwan, a city of Irak, bordering on Curdiftan. Neverthelefs the orthodox among them acknowledge this general deftruction by water, fent by God to punifh the crimes of mankind: one of whom, named Malcus, was a monfter of wickednefs and impiety. One odd circumftance mentioned by them is, that the firft waters of the deluge gufhed out of the oven of a certain old woman, named Zala Cufa: and Mahomet has borrowed this circumftance, and inferted it in his Koran; the commentators on which fay, that it was the fign by which Noah knew the flood was coming. (Al Koran, cap. xi. D'Herbelot. Bib. Orient. Hyde de Rel. Vet. Perf. c. x.) Lord's account of the religion of the Perfes, p. 9.

Plutarch (De Solert. Anim. v. ii. p. 968.) mentions the Noachic dove, and its being fent out of the ark; and its going out was to Deucalion a fign of fine weather, as its return denoted the reverfe. Melo, or Melon, who wrote a treatife againft the Jews, (fee Eufeb. Præp. Evang. l. ix. c. 19.) takes notice, among other things, of the perfon who furvived the deluge, retreating with his fons, after the calamity from Armenia; and he fuppofes that they came to the mountainous parts of Syria, inftead of the plains of Shinar. This writer feems to reprefent the deluge as topical, and not to have reached Armenia.

That the Egyptians were no ftrangers to the deluge appears, not only from feveral circumftances in the hiftory of Ofiris and Typhon, particularly the very day when it began, or when Ofiris, (who is taken for Noah) was fhut up in the ark, and the name of Typhon, which, according to fome learned men, fignifies a deluge or inundation; but alfo from the teftimony of Plato, who fays, that a certain Egyptian prieft recounted to Solon, out of their facred books, the hiftory of the univerfal flood, which happened long before the particular inundations known to the Grecians. It is the tradition of the Egyptians, as we learn from Diodorus Siculus (lib. i.) that the univerfal deluge was that of Deucalion. But the moft particular hiftory of the deluge, and the neareft of any to the account given by Mofes, is to be found in Lucian. (De Dea-Syria, vol. ii. p. 882.) He was a native of Samofata, a city of Comagene upon the Euphrates; a part of the world where memorials of the deluge were particularly preferved, and where a reference to that hiftory is continually to be obferved in the rites and worfhip of the country.

try. His knowledge was therefore obtained from the Afiatic nations, among whom he was born. He defcribes Noah under the name of Deucalion, and fays, that "the present race of mankind are different from thofe who firft exifted; for thofe of the antediluvian world were all deftroyed. The prefent world is peopled from the fons of Deucalion having increafed to fo great a number from one perfon. In refpect to the former brood, they were men of violence, and lawlefs in their dealings. They regarded not oaths, nor obferved the rites of hofpitality, nor fhewed mercy to thofe who fued for it; on this account they were doomed to deftruction; and for this purpofe there was a mighty eruption of waters from the earth, attended with heavy fhowers from above, fo that the rivers fwelled, and the fea overflowed, till the whole earth was covered with a flood, and all flefh drowned. Deucalion alone was preferved to re-people the world. This mercy was fhewn to him on account of his juftice and piety. His prefervation was effected in this manner: he put all his family, both his fons and their wives, into a vaft ark, which he had provided; and he went into it himfelf. At the fame time animals of every fpecies, boars, horfes, lions, ferpents, whatever lived upon the face of the earth, followed him by pairs, all which he received into the ark, and experienced no evil from them; for there prevailed a wonderful harmony throughout, by the immediate influence of the Deity. Thus were they wafted with him, as long as the flood endured." After this he proceeds to mention, that upon the difappearing of the waters, Deucalion went forth from the ark, and raifed an altar (altars, according to Gen. vi. 20.) to God: but he tranfpofes the fcene to Hierapolis in Syria, where the natives pretended to have very particular memorials of the deluge. Moft of the authors, who have tranfmitted to us thefe accounts, inform us at the fame time, that the remains of the ark were to be feen in their days upon one of the mountains of Armenia. Abydenus fays, that the people of the country ufed fmall pieces of the wood as amulets; and Berofus fays the fame of the afphaltus, with which it was covered, and which they fcraped off.

The learned Bryant, in his "Analyfis of Ancient Mythology," (vol. ii.) has traced out a reference to Noah and the deluge, and a refemblance of the ark, in many of the religious rites and ceremonies of ancient nations. The well-known fhip of Ifis, among the Egyptians, was, as he conceives, a facred emblem; in honour of which thefe people celebrated an annual feftival. It was, in after-times, admitted among the Romans, and fet down in their calendar for the month of March. The temple of Ofiris (or Sefoftris) at Theba was built after the model of a fhip, 280 cubits in length; and both the city, faid to be the moft ancient in Egypt, as well as the province, was denominated from the ark, called תבה, Theba, by the facred writer. The fame memorial is to be obferved in other countries, where an ark, or fhip, was introduced in their myfteries, and often carried about upon their feftivals; and many inftances of emblematical reprefentations are cited by Bryant, which related to the hiftory of the deluge, and the confervation of one family in the ark. This hiftory was pretty recent, when works of this kind were executed in Egypt, and when the rites to which they belonged were firft eftablifhed; and this learned writer imagines, that in early times moft fhrines among the Mizraim were formed under the refemblance of a fhip, in memory of this great event. He adds further, that both fhips and temples received their names from hence; being ftyled by the Greeks, who borrowed largely from Egypt, Ναυς and Ναος, and Mariners Ναυται, Nautæ, in reference to the Patriarch, who was varioufly ftyled Noas, Naus, and Noah. Plutarch (Ifis and Ofiris, vol. i. p. 366, 367.) gives us a remarkable account of Ofiris being expofed in an ark. He fays, that it was on account of Typhon; and that it happened on the 17th of the month Athyr, when the fun was in Scorpio. "This in my judgment;" fays Bryant, "was the precife time, when Noah entered the ark, and when the flood came; which in the Egyptian mythology was termed Typhon." From thefe, and many other circumftances that might be recited, it fufficiently appears, that the hiftory of the deluge was no fecret to the Gentile world. They held the memory of it very facred; and many colonies which went abroad, ftyled themfelves Thebeans, in reference to the ark; and many cities of the name of Theba occur, not in Egypt only and Bœotia, but in Cilicia, Ionia, Attica, Phthiotis, Cataonia, Syria, and Italy.

The tradition of the deluge has, indeed, fpread throughout the world, and is preferved in the memory of all nations; in the continent of America, as well as Afia, in the Eaft and Weft Indies, among the Africans and Europeans. (See Burneti Telluris Theor. Sacra. l. i. c. 3.)

We are told, indeed, (fee Code of Gentoo Laws, Pref. p. 38.) that the Gentoo fcriptures make no mention of the deluge; and that the Bramins affirm, that the deluge never took place in Hindooftan. If this be true, it may well excite aftonifhment, fince the deluge is an event fo fingular in its nature, that fuppofing it to have happened, the memory of it could never have been extinguifhed amongft the generality of nations which inhabit the earth; and more efpecially, fince learned men have abundantly proved that a tradition concerning a deluge has prevailed in every quarter of the globe; not only amongft the Romans, Grecians, Egyptians, Babylonians, Perfians, Scythians, but amongft the Iroquois, Mexicans, Brafilians, Peruvians, and other nations of America. Moreover, we are informed by one of the navigators to the Southern Hemifphere, that the inhabitants of Otaheite being afked concerning their origin, fimply anfwered, that their fupreme god a long time ago, being angry, dragged the earth through the fea, and their ifland being broken off was preferved. Now, if a tradition concerning a deluge has prevailed in almoft every part of the globe, except in India, and, as fome fay, in China, may we not hefitate a little till we know more of thofe countries, before we pofitively affirm, that they have no fuch tradition? For it deferves to be remarked, that what is faid in the preface to the code of Gentoo laws, relative to the want of a tradition concerning a deluge in the Gentoo Shafters (or Scriptures) is contradicted by an author who lived in India, and wrote his account of the Banians about 150 years ago; for he exprefsly fays, that he made his collections, by the help of interpreters, from the Shafter, and he has the following words:—"As if the world needed cleanfing of its defilement and pollution, there came a flood, that covered all nations in the depths—and fo concluded the firft age of the world according to the tradition of the Banians." (Lord's Difcovery of the Banian Religion, c. 6.) Sir William Jones, than whom there could not be a more competent judge, and one on whofe teftimony we may more fecurely rely, affirms, "that a tradition concerning a deluge does certainly fubfift in Hindooftan," and that in the oldeft mythological books there is fuch an account of the deluge as fufficiently correfponds with that of Mofes. (See Bifhop Watfon's Difcourfe to the Clergy, &c. in his Sermons and Tracts, p. 220.) The learned prelate (p. 229.) has recorded a very curious paffage, quoted in the "Flora Saturnifans" of Henckel (Paris ed. 1760) from the works of Rammazini, concerning the primitive ftate of the earth, and the fubfequent deluge, taken, as it is faid, from the moft ancient annals

nals of Ethiopia. The account bears a great refemblance to the hypothefis of Dr. Burnet. It muft be owned, however, that feveral of the deluges which tradition records, were merely topical inundations; and they fhould be carefully diftinguifhed from that of Noah; though ancient and modern writers frequently confound them together. Moreover, natural, as well as civil, hiftory bears a ftrong teftimony to Mofes's account of the deluge; and fhews that it muft have been univerfal, or nearly fo, however difficult it may be for us, either to find fources fufficiently ample for fo great a body of waters, or methods for removing them. The prefent external furface of the earth, its internal conftitution, the arrangements of its various ftrata, the remains of marine animals and petrified fhells found at great diftances from their original habitation, incorporated with the earth, or on eminences far elevated above the level of the fea, and other circumftances that prefent themfelves to the fagacious naturalift in his furvey and examination of various parts of the terreftrial globe, have been alleged as exifting monuments of a deluge, and evidences of its univerfality. In vindication of the Mofaic account of the deluge, we might further allege the paucity of mankind, and the vaft tracts of uninhabited land, which are mentioned in the hiftories of the firft ages, which fhew that mankind were lately fprung from a fmall ftock, and even fuit the time affigned by Mofes for the flood. Moreover, the great number of fmall kingdoms, and petty ftates in the firft ages, and the late rife of the great empires of Egypt, Affyria, Babylon, &c. concur to the fame purpofe. We might add, the invention and progrefs of arts and fciences, which alfo favour the Mofaic hiftory of the antediluvians. As to the objections urged againft the deluge from the fize of the ark and the number of animals contained in it: fee ARK.

The deluge has been, and remains, a fubject of much enquiry and difpute among naturalifts, critics, &c. The points chiefly controverted may be reduced to three; firft, its extent: *viz.* whether it were *general*, or *partial;* fecondly, its natural caufe; and, thirdly, its effects.

1. The immenfe quantity of water requifite to furnifh an univerfal deluge, has occafioned feveral authors to fufpect it only partial. An univerfal deluge, they think, had been unneceffary, confidering the end for which it was brought; *viz.* to extirpate the wicked inhabitants. The world was then but new, and the people not very many; the holy Scriptures making only eight generations from Adam to Noah. It was but a fmall part of the earth that could be yet inhabited; the country about the Euphrates, which is fuppofed to have been the fcene of the firft antediluvian inhabitants, was fufficient to bear them all. Now Providence, fay they, which ever acts wifely, and frugally, would never have difproportioned the means to the end, fo far as to overflow the whole globe, only to drown a little corner of it. They add, that, in the Scripture-language, the *whole earth* expreffes no more than *all the inhabitants;* and on this principle advance, that an overflowing of the Euphrates and Tigris, with a vehement rain, &c. might anfwer all the phenomena of the deluge. Others pretend, that the deluge was confined to Judæa alone and the adjacent regions; or perhaps to the tract of land which lies between the four feas, the Perfian, Cafpian, Euxine, and Mediterranean; or, at moft, that it reached no farther than the continent of Afia. This, they fay, would anfwer the purpofe of deftroying mankind, which was the primary object of this cataftrophe. Indeed, Bedford, in his "Scripture Chronology," fuppofes that all mankind did not perifh in the deluge; and he has endeavoured to prove, from a peculiar expofition of the curfes of Cain and Lamech, that the Africans and Indians are of their pofterity. But, if we advert to the language of fcripture, we muft conclude that the deluge was univerfal. God declared to Noah, Gen. vi. 17. that he was refolved to deftroy every thing that had breath under heaven, or had life on the earth, by a flood of waters; fuch was the menace; fuch the execution. The waters, Mofes affures us, covered the whole earth, buried all the mountains, and were no lefs than fifteen cubits above the higheft of them: every thing perifhed therein; birds, beafts, men, and all that had life, excepting Noah, and thofe with him in the ark, Gen. vii. 19, &c. Can an univerfal deluge be more clearly expreffed? If the deluge had only been partial, there had been no neceffity to fpend a hundred years in the building of an ark, and fhutting up all the forts of animals therein, in order to re-ftock the world: they had been eafily and readily brought from thofe parts of the world not overflowed, into thofe that were: at leaft, all the birds would never have been deftroyed, as Mofes fays they were, fo long as they had wings to bear them to thofe parts where the flood did not reach. If the waters had only overflowed the neighbourhood of the Euphrates and Tigris, they could not be 15 cubits above the higheft mountains; they could not have rifen to that height, but they muft fpread themfelves, by the laws of gravity, over the reft of the earth; unlefs, perhaps, they had been retained there by a miracle; and, in that cafe, Mofes, no doubt, would have related the miracle, as he did that of the waters of the Red fea, and the river Jordan, which were fuftained in a heap, to give paffage to the Ifraelites, Exod. xiv. 22. and Jofh. iii. 16. Add, that, in regions far remote from the Euphrates and Tigris, *viz.* in Italy, France, Switzerland, Germany, England, &c. there are frequently found in places many fcores of leagues from any fea, and even in the tops of high mountains, whole trees funk deep under ground; as alfo teeth and bones of animals, fifhes entire, fea-fhells, ears of corn, &c. petrified; which many naturalifts are agreed could never have come there but by the deluge, unlefs we fuppofe with others that thefe organic remains were of a prior race, and that the ftrata of the earth (fee STRATA) were formed previoufly to the deluge:—to which may be added the almoft univerfal traditions of this great event in all countries of the globe.

2. The deluge allowed to be univerfal, the philofophers are folicitous to find water to effect it.

Mofes brings it from two fources: *the fountains of the great deep were broken up; and the windows of heaven were opened: and the rain was upon the earth* 40 *days and* 40 *nights.* Dr. Burnet, in his "Telluris Theoria Sacra," fhews, that all the waters of the ocean were not near enough to cover the earth fifteen cubits above the tops of the higheft mountains. According to his computation, no lefs than eight oceans were required. Suppofing the fea, therefore, drained quite dry, and all the clouds of the atmofphere diffolved into rain, we fhould ftill want much the greateft part of the water of a deluge.

To get clear of this embarraffment, many of our beft naturalifts, as Steno, Burnet, Woodward, Scheuchzer, &c. adopt Des Cartes' fyftem of the formation of the earth. That philofopher will have the primitive world to have been perfectly round and equal, without mountains or vales; and accounts for its formation on mechanical principles, by fuppofing it at firft in the condition of a thick turbid fluid, replete with diverfe heterogeneous matters which, fubfiding by flow degrees, formed themfelves into different concentric ftrata, or beds, by the laws of gravity; and thus, at length, left a dry folid earth. Dr. Burnet improves on this theory: he fuppofes the primitive earth to have been no more than an orbicular cruft, fmooth, regular, and uniform, without mountains, and without a fea, invefting the face of the abyfs, or

or deep, which being heated by the ſun became dry and chinky, and by the rarefaction and expanſion of the encloſed vapours, clave, burſt, and fell down into the water, and ſo drowned its inhabitants.

The ſame theoriſt adds, that by this cataſtrophe, the globe of the earth was not only ſhaken, and broken in a thouſand places, but the violence of the ſhock it then underwent ſhifted its ſituation; ſo that the earth, which before was placed directly under the zodiac, or had the plane of the equator coincident with the plane of the ecliptic, ſo that the ſun in its diurnal motion would ſeem to move always in the equator, became henceforth oblique to the ſame. Whence aroſe the difference of ſeaſons, which did not belong to the antediluvian earth.

Thoſe maſſes of the earth which fell into the abyſs of waters, carried with them, according to this author, vaſt quantities of air, daſhed againſt each other, and accumulated and divided ſo irregularly, that great cavities filled with air, were left between them. The waters gradually opened paſſages into theſe cavities, and in proportion as the cavities were filled with water, the ſurface of the earth began to diſcover itſelf in the moſt elevated places; and, at laſt, the waters appeared nowhere but in thoſe extenſive vallies which contain the ocean. Thus our ocean is a part of the ancient abyſs, the reſt of it remains in the internal cavities, with which the ſea has ſtill a communication. Iſlands and ſea-rocks are the ſmall fragments; and continents are the large maſſes of the ancient cruſt. As both the rupture and fall of this cruſt were effected in a confuſed manner, it is not ſurpriſing that the ſurface of the preſent earth ſhould be full of mountains, gulfs, plains, and irregularities of every kind.

Dr. Burnet's hypotheſis is very elegantly recited, and has by ſome been called a romance: but it is utterly inconſiſtent with the ſacred text above cited, which expreſsly mentions mountains as the ſtandard of the height of the water; or with that other paſſage, Gen. viii. 22. where God, promiſing not to bring any more deluges, but that every thing ſhould be reſtored to its ancient ſtate, ſays, that *ſeed-time and harveſt, and cold and heat, and ſummer and winter, and day and night, ſhall ceaſe no more.*

It alſo contradicts the phyſical principles of nature, as Keill has ſhewn in his "Examination of Dr. Burnet's Theory of the Earth," p. 116, &c. ed. 2. This author, having ſhewn that the axis of the primitive earth was inclined to the plane of the ecliptic as it is at preſent, concludes, that it was ſubject to the ſame variety of ſeaſons and alterations of heat and cold as it is now; and, therefore, that all the arguments drawn from the great heat and ſtrong action of the ſun upon the antediluvian earth are of no avail, ſince there was then no greater heat of the ſun than there is at preſent. Beſides, judging from experience, the heat of the ſun does not penetrate far into the earth, and accordingly its beams could reach but a little way into the imaginary cruſt of the theoriſt; and within the bowels of the earth there is no ſenſible difference between the heat of the ſun when its action is ſtrongeſt, and when it is weakeſt. Since then the heat of the ſun does not penetrate the earth ſo as to be ſenſible for the ſmall ſpace through which we are able to dig, how can we imagine it poſſible that it ſhould ever reach the abyſs, through the whole exterior cruſt of the earth, ſo as to be able to heat the water and raiſe it into vapour? But even allowing that the heat of the ſun had reached the abyſs, and had raiſed the vapours ſo that the cruſt of the earth fell down and was broken into pieces, we cannot infer that the conſequence would be an univerſal deluge, or indeed any deluge at all. Admitting the author's own principles, all the water contained in the abyſs was long before the time of the deluge drawn out of the abyſs, and placed on the ſurface of the earth; and in this caſe how can he conſiſtently explain an univerſal deluge by the fall of the outward cruſt of the earth upon the abyſs? This fall would have been ſo far from being the cauſe of a deluge, that it would have proved the moſt effectual method of reſcuing the earth from a deluge of waters which were then upon it. For all the water which was in the abyſs, being drawn up on the ſurface of the land, and the earth being of a ſpheroidical and oval ſhape, without hills and mountains, upper and lower grounds, but exactly of the ſame figure which its gravity and centrifugal force formed it into, when it was fluid; the great maſs of water which was then upon the earth muſt have ſettled itſelf alſo in the ſame figure, as it had no banks to retain it within its channel, or mountains to keep it within bounds; and the true effect of the fall of the cruſt muſt have been to have diſcovered the land, and the waters would have run from the ſurface of the earth into the abyſs, and there would have formed a ſea, and made that land appear which before was covered with waters. But ſuppoſing that all the water, which is now in the ocean, was in the abyſs at the time of the deluge, and that the cruſt of the earth was broken and had fallen down on the ſurface of the abyſs, yet how could this fall produce an univerſal deluge, and make the waters ſwell above the tops of the higheſt mountains? For Dr. Burnet himſelf calculates, that it would require eight oceans of waters to cover the face of the whole earth, and raiſe the waters to a height ſufficient for drowning the world. As there is but one ocean of water in the abyſs, the fall of the cruſt could only produce a partial and topical deluge. Beſides, if the abyſs contained water ſufficient for covering the face of the whole earth at once, yet it is not poſſible to conceive how ſuch a flood of waters that was raiſed by the fall of the cruſt could laſt for ſo long a time, as the Scriptures inform us Noah's flood did, which was 150 days without abating on the face of the earth.

Other authors, ſuppoſing a ſufficient fund of water in the abyſs, or ſea, are only concerned for an expedient to bring it forth: accordingly, ſome, as Mr. Ray, &c. have recourſe to a ſhifting of the earth's centre, which, drawing after it the water out of its channel, overwhelmed the ſeveral parts of the earth ſucceſſively. But this could only occaſion a partial deluge in that part of the globe towards which the centre of gravity was tranſlated: nor can the poſſibility of ſuch a tranſlation be allowed, ſince the centre of gravity is the neceſſary reſult of the materials compoſing our globe, and not alterable whilſt the parts remained in the ſame poſition.

Dr. Hook's opinion of the compreſſion of a ſhell of earth into a prolate ſpheroid, thereby preſſing out the water of an abyſs under the earth, may very well account for the waters overflowing two oppoſite zones of the globe; but the middle zone being by much the greater part of the earth's ſurface, muſt by this means be raiſed higher from the centre, and conſequently ariſe more out of the water than before.

In Hook's "Diſcourſe of Earthquakes," written about the year 1688, there is mention made of the bottom of the ſea having been raiſed by ſubterraneous fires; and he accounts for the ſhells which are found on mountains from that principle, and thinks it not improbable, that earthquakes were inſtrumental in occaſioning the deluge. "The Alps and divers other high mountains, on whoſe tops are found ſuch numbers, and ſuch varieties of ſea-ſhells, may have been heretofore raiſed up from the bottom of the ſea—it is not improbable but in the flood of Noah, the Omnipotent might

make uſe of this means (earthquakes) to produce that great effect."

Dr. Halley aſcribes the deluge to the ſhock of a comet, or ſome other ſuch tranſient body, whereby the polar and diurnal rotation of the globe would be inſtantly changed. The great agitation that muſt have been occaſioned by it in the ſea, he obſerves, would be ſufficient to account for all theſe ſtrange appearances of heaping vaſt quantities of earth and high cliffs upon beds of ſhells, which were once the bottom of the ſea, and raiſing up mountains where none were before. Such a ſhock as this, impelling the ſolid parts, would occaſion the waters, and all fluid ſubſtances that were unconfined, as the ſea is, to run violently with an impetus towards that part of the globe where the blow was received, and that with force ſufficient to take with it the very bottom of the ocean, and remove it to the land. In this caſe, it is much more difficult to ſay, how Noah and his family could be preſerved, than how all other creatures were deſtroyed: ſuch a ſhock would change the length of the day and year, by altering the axis of the globe, according to the obliquity of the incidence of the ſtroke. It is objected to this ſyſtem, that ſuch a ſhock muſt have brought on the deluge inſtantaneouſly, and not gradually, as it is ſaid to have happened. Phil. Tranſ. N° 383. p. 120, or abr. vol. vii. p. 1. &c.

The inquiſitive Mr. Whiſton, in his "New Theory of the Earth," has a very ingenious hypotheſis, ſimilar to that ſuggeſted by Dr. Halley, with reſpect to the primary cauſe of the deluge, but much more largely applied and explained. He ſhews, from ſeveral remarkable coincidences, that a comet, deſcending in the plane of the ecliptic towards its perihelion, paſſed juſt before the earth on the firſt day of the deluge; the conſequences whereof would be, firſt, that this comet, when it came below the moon, would raiſe a prodigious, vaſt, and ſtrong tide, both in the ſmall ſeas, which, according to his hypotheſis, were in the antediluvian earth, for he allows no great ocean there, as in ours; and alſo in the abyſs, which was under the upper cruſt of the earth; and that this tide would riſe, and increaſe all the time of the approach of the comet towards the earth; and would be at its greateſt height when the comet was at its leaſt diſtance from it. By the force of this tide, and alſo by the attraction of the comet, he judges, that the abyſs muſt put on an elliptic or rather an exactly oval figure, whoſe ſurface being conſiderably larger than the former ſpherical one, the outward cruſt of the earth, incumbent on the abyſs, muſt accommodate itſelf to that figure, which it could not do while it remained ſolid and conjoined together. He concludes, therefore, that it muſt of neceſſity be extended, and at laſt broke, by the violence of the ſaid tides, and attraction; and have innumerable fiſſures made quite through it; out of which, the included water iſſuing, was a great means of the deluge; this anſwering to what Moſes ſpeaks of the *fountains of the great deep being broken open.* Again, the ſame comet, he ſhews, in its deſcent towards the ſun, muſt have paſſed ſo cloſe by the body of the earth as to involve it in its atmoſphere, and tail, for a conſiderable time; and of conſequence, it muſt have left a vaſt quantity of its vapours, both expanded and condenſed, on its ſurface; a great part of which, being rarefied by the ſolar heat, would be drawn up again into the atmoſphere, and afterwards deſcend in violent rains upon the earth: and this he takes to be what Moſes intimates *by the windows of heaven being opened;* and particularly by the *forty days rain.* For as to the following rain, which, with this, made the whole time of raining an hundred and fifty days, Mr. Whiſton attributes it to the earth coming a ſecond time within the atmoſphere of the comet, as the comet was on its return from the ſun. From the comet's atmoſphere and tail he derives one-half of the water, which ſerved for the deluge; the other half, he ſuppoſes, was deduced from the ſubterraneous abyſs, the fluid of which, he ſays, was forced upon the ſurface of the earth by the prodigious preſſure of the incumbent water that was derived from the comet's atmoſphere and tail, which, he ſuppoſes, would preſs downwards with a mighty force, and endeavour to ſink the outward cruſt of the earth into the abyſs; by the preſſure of which vaſt quantities of the ſubterraneous fluid would be forced and raiſed upon the ſurface of the earth, through the cracks and fiſſures that were made in the cruſt by the violence of the tide in the abyſs. By this method, Mr. Whiſton ſuppoſes that water enough would be obtained on the ſurface to cover the face of the whole earth to the perpendicular height of three miles, that is, above the tops of the higheſt mountains. But he further ſuppoſes, that neither that water which was derived from the comet, nor that which was forced up from the bowels of the earth, was pure elementary water, but rather a thick and muddy fluid, which, he ſays, being heavier than water, ſunk to the bottom and covered the earth to the depth of 166 feet. Laſtly, to remove this vaſt orb of waters again, he ſuppoſes a mighty wind to have ariſen, which dried up ſome, and forced the reſt into the abyſs again through the clefts by which it came up: only a good quantity remained in the alveus of the great ocean, now firſt made, and in leſſer ſeas, lakes, &c.

To the credit of this theory, it muſt be obſerved, that it was at firſt only propoſed hypothetically: that is, the author only ſuppoſed ſuch a comet, merely as it would account well, and philoſophically, for the phenomena of the deluge; without any aſſurance, that there really was any comet ſo near the earth at that time; and the hypotheſis pleaſed even under ſuch circumſtances: but, upon further conſideration, he has ſince, he thinks, proved, that there actually was a comet near the earth at that time, or 28th November, in the 2365th year of the Julian period, or the 2349th year before Chriſt, to which time he aſſigns the beginning of the deluge, *viz.* the ſame great comet which appeared again in 1680. The author no longer, therefore, looks upon it as an hypotheſis, but has republiſhed it in a particular tract, intitled, "The Cauſe of the Deluge demonſtrated."

Mr. Keill, in his "Remarks on Mr. Whiſton's Theory," acknowledges that it is much more philoſophical than many others, and that he has rendered probable the approach of a comet at the preciſe time of the deluge. He objects, however, to his explications of ſeveral phenomena of the deluge, as not agreeable to the laws of mechanics and philoſophy; although it is certain, that a comet, when it paſſed by the earth, would raiſe a very ſtrong tide in the ſeas that were then on the ſurface; yet it is very far from being evident, that ſuch an effect would be produced in the abyſs, which, he ſuppoſes, to be a denſe and heavy fluid encompaſſed on all ſides with a thick and ſolid cruſt of earth lying cloſely upon it. Hence, if there was no tide in the abyſs, it could make no cracks and fiſſures in the earth. Mr. Whiſton, in explaining the great rains which fell on the earth during the time of the deluge, aſſumes a propoſition ſcarcely capable of proof; *viz.* that after the earth was involved in the comet's atmoſphere and tail, and had acquired a prodigious quantity of condenſed and expanded vapours that fell on its ſurface, a great part of them being much rarefied would be drawn up again into the air, and afterwards deſcend in violent rains. If we conſider the incredible velocity with which thoſe vapours deſcended, being at the rate of 868 miles in a minute, and the great reſiſtance they met with

with in their defcent through the air, and the force with which they fell on the ground; we muft admit their condenfation and converfion into water, by fuch a refiftance and fall. Hence, it is evident, that all fuch vapours as defcended from the comet muft have been condenfed into water long before they ever touched the earth. Since then, they defcended on the earth in the form of water, and the heat of the fun was not fufficient to raife them up again immediately, it is plain they could never rife up fo as to produce the 40 days rain mentioned in Scripture. Mr. Keill alfo objects to Mr. Whifton's account of the effect of the preffure of the waters, that had defcended from the comet, on the cruft of the earth, fo as to occafion the afcent of the waters of the abyfs through the cracks and fiffures on the furface of the earth. He thinks it is demonftratively evident, that by no fort of preffure of the incumbent fluid the abyfs could be forced upwards to fpread itfelf on the furface of the earth. Mr. Keill further examines Mr. Whifton's method of drawing from the earth the waters neceffary for the deluge, which he attributes partly to a drying wind, and partly to the defcent of the waters through the fiffures of the earth. But he previoufly eftimates the quantity of waters that would be neceffary to cover the whole earth above the tops of the higheft mountains. Dr. Burnet, as we have already mentioned, ftates it to be about eight oceans of water, fuppofing the furface of the fea to be equal to the land, and to be every where, at an average, a quarter of a mile deep. Keill thinks it to be about three times as much. In order to afcertain this point, he affumes the perpendicular height of the higheft mountain above the level of the ocean to be above three miles. Upon this fuppofition, the waters muft be raifed more than three miles in perpendicular height that they may be as high as the tops of the hills. It is eafy to calculate how much water would be neceffary to raife the furface of the fea to fuch a height. The ocean being by hypothefis a quarter of a mile deep, there muft not be lefs than twelve oceans of water lying on the furface of the fea, that it may be of the fame height with the water which covered the land. Mr. Keill, by purfuing his calculation, on the fuppofition that the furface of the earth is befet with mountains, each of which is three miles perpendicularly high, eftimates the whole quantity of water that would be neceffary for an univerfal deluge at 22 oceans, befides the waters that compofe the prefent ocean, or in the whole 23 oceans. But if the height of the mountains be greater, more water will be required to anfwer the purpofe. (See the fequel of this article.) Although fuch a quantity of water may be fuppofed to be derived from the atmofphere of a comet, yet it will not be eafy to contrive a method for removing it again from the earth; that which Mr. Whifton propofes by evaporation and by defcent into the abyfs, being very infufficient for the purpofe.

3. But the great difficulty ftill remains. The orderly ftrata, or layers of the earth, with the exuviæ, or remains of fifhes, as their teeth, bones, fhells, &c. both marine, and fluviatile, found in the bodies even of the moft folid ftrata, and in flints, marbles, &c. are not yet accounted for. Thofe who adhere to Des Cartes' fyftem, as Steno, &c. take the finding of the parts of terreftrial, and aquatic animals, branches of trees, leaves, &c. in the beds, or ftrata of ftone, to be a direct proof of the primitive fluidity of the earth. But then they are obliged to have recourfe to a fecond formation of ftrata, much later than the firft; becaufe, at the time of the firft there was neither plant nor animal in being. Steno, therefore, maintains fecond formations, occafioned at different times by extraordinary inundations, earthquakes, volcanoes, &c. But Burnet, Woodward, Scheuchzer, &c. choofe rather to attribute a fecond general formation to the deluge; without excluding, however, the particular ones of Steno. But the great objection againft this fyftem of fluidity, is mountains; for the whole globe being liquid, whence fhould fuch inequalities arife? Mr. Scheuchzer, rather than part with a fyftem which feems fo promifing, gives into the opinion of thofe who hold, that, after the deluge, God, to remit the waters into their fubterranean refervoirs, broke and difplaced, with his own almighty hand, a great number of ftrata, that were before horizontal, and raifed them above the furface of the earth, which was originally land; whence it is, that the ftrata in mountains, though concentrical, are never horizontal. Hift. de l'Acad. 1708. p. 32. Pifcium Querelæ, &c. and Phyfica Sacra.

Dr. Woodward, taking the feveral ftrata for the fediments of a deluge, and confidering the circumftances of thofe fifhes, fhells, and other exuviæ, found in them, draws feveral inferences, which very much illuftrate the effects of the deluge. As, firft, that thefe marine bodies, and other fpoils of falt-water fifhes, were borne forth out of the fea, by the univerfal deluge; and, on the return of the water back again, were left behind upon the land. Secondly, that while the flood covered the globe, all the folid matters, as ftones, metals, minerals, and foffils, were totally diffolved, and the cohefion of their corpufcles deftroyed; and that their corpufcles, with thofe of the lefs folid bodies, as earth, flefh of animals, and vegetables, were fuftained promifcuoufly in the water, and made one common mafs. Thirdly, that all the mafs, thus fuftained, was at length precipitated to the bottom; and that, according to the laws of gravity, the heavieft fettled firft, and the reft in order. And that the matters, thus fubfiding, conftituted the feveral ftrata of ftone, earth, coal, &c. Fourthly, that thefe ftrata were originally all parallel, even, and regular, and rendered the furface of the earth perfectly fpherical; and that the whole mafs of water lay upon them, and conftituted a fluid fphere encompaffing the globe. Fifthly, that after fome time, by the force of an agent feated within the earth, thefe ftrata were broken on all fides of the globe, and their fituation varied; being elevated in fome places, and depreffed in others; whence mountains, vallies, grottos, &c. with the channel of the fea, iflands, &c. In one word, the whole terraqueous globe was put, by this difruption, and diflocation of the ftrata, into the condition we now behold it in. Sixthly, that upon the difruption of the ftrata, and the depreffion of fome and elevation of other parts, which happened towards the end of the deluge, the mafs of water fell back again into the depreffed and loweft parts of the earth, into lakes, and other cavities, and the channel of the ocean, and through the fiffures, whereby this communicates with the abyfs, which it filled till it came to an equilibrium with the ocean. Nat. Hift. of Earth, p. 1. and 2.

To this fyftem it has been objected, that it is abfurd to fuppofe, that, before the deluge, there were no mountains, fince we are exprefsly told, that the waters rofe 15 cubits above the tops of the higheft mountains: on the other hand, it is not faid that the waters deftroyed or diffolved the mountains. On the contrary, the mountains remained firm in their original fituation, and the ark refted upon that which was firft deferted by the waters. Befides, it cannot be reafonably imagined, that, during the fhort time of the deluge, the waters could diffolve the mountains, and the whole fabric of the earth. Can we fuppofe, that, in the

ſpace of 40 days, the hardeſt rocks and minerals were diſſolved by ſimple water, and yet that ſhells, bones, and other productions of the ſea, were able to reſiſt a menſtruum to which the moſt ſolid materials had yielded?

Dr. Woodward aſſerts, that the materials of the different ſtrata are arranged according to their ſpecific gravities. To this it has been objected, that we every day ſee ſolid rocks placed above clay, ſand, pit-coal, bitumen, and other comparatively light bodies. If, indeed, it were uniformly found, through the whole earth, that the upper ſtratum was bitumen, followed ſucceſſively by ſtrata of chalk, marl, clay, ſand, ſtone, marble, and metals, it would, in that caſe, be probable, that all theſe materials had been precipitated at once; and this Mr. Woodward confidently affirms. Whereas, the moſt ſuperficial obſerver need only open his eyes to convince himſelf, that heavy ſtrata are often found above light ones; and, conſequently, that theſe ſediments could not be depoſited at the ſame time, but muſt have been tranſported and depoſited, as M. Buffon ſays, by the ocean at ſucceſſive periods. See STRATA.

M. de la Pryme has advanced another ſyſtem for ſolving the phenomena of petrified exuviæ.

The antediluvian world, according to this author, had an external ſea, as well as land, with mountains, rivers, &c. and the deluge was effected by breaking the ſubterraneous caverns, and pillars thereof, with dreadful earthquakes, and cauſing the ſame to be for the moſt part, if not wholly, abſorbed and ſwallowed up, and covered by the ſeas that we now have. Laſtly, this earth of ours aroſe out of the bottom of the antediluvian ſea, and in its room; juſt as many iſlands are ſwallowed down, and others thruſt up in their ſtead.

This ſyſtem, it has been ſaid, is very agreeable to Scripture, and eaſily ſolves the great difficulties that clog all the other ſyſtems. It is no longer a wonder, that ſhells, and ſhell-fiſh, and the bones of fiſhes, and four-footed creatures, with fruits, &c. ſhould be found in beds and quarries, in mountains and vallies, and the very bowels of the earth: for here they bred in the antediluvian ſea; thither they were elevated with the hills and mountains, in the time of the deluge; and there they fell into, were abſorbed, and buried in chaſms, and holes and clefts, that would neceſſarily happen in the extruſion of the earth. Phil. Tranſ. N° 266.

Mr. King has more lately adopted an hypotheſis reſembling this laſt. He aſcribes the deluge to ſubterraneous fires found within the bowels of the earth, which, at the appointed time, burſt forth with great violence under the ſea, and raiſed up the bottom of the ocean, ſo as to pour out the waters over the face of what was before dry land, which by that means became the ſea, and has ſince continued, and that which was before the bottom of the ſea became dry land. An earthquake thus occaſioned will account, he ſuppoſes, for the acceſs of the deluge and the confuſed diſpoſition of marine productions in the poſtdiluvian earth. Phil. Tranſ. vol. lvii. p. 44, &c.

Mr. King's hypotheſis has been much enlarged by M. de Luc. According to this hypotheſis the ancient continents muſt have exiſted in thoſe tracts now covered by the Atlantic and Pacific oceans. It has been objected to this theory, that it is inconſiſtent with the Moſaic account of the deluge, which account theſe philoſophers, however, admit. Moſes aſcribes the deluge to two principal cauſes, a rain of 40 days and the eruption of the waters of the great abyſs. Now to what purpoſe, it has been queried, a rain of 40 days to overwhelm a continent, that was to be immerſed under a whole ocean? He informs us that the waters increaſed on the continents for a certain number of days, reſted thereon another period of days, and then returned. Do not theſe expreſſions imply a permanent ground on which they increaſed and reſted, and from which they afterwards retreated? As the retreat followed the advance, is it not clear that they retreated from the ſame ſpace on which they had before advanced and reſted?

M. de Luc replies, that in the 13th verſe of the ſixth chapter of Geneſis it is ſaid the earth ſhould be deſtroyed, and that Michaelis ſo tranſlates it. But from the obſervations already made, it is plain that Moſes did not underſtand ſuch a deſtruction as ſhould cauſe it to diſappear totally and for ever: he tells us that the waters ſtood 15 cubits over the higheſt mountains; and as he has no where mentioned the antediluvian mountains, but has taken notice of the poſtdiluvian, it is plain that his narrative relates to theſe, and theſe, he ſays, were at the time of the deluge covered with water, and uncovered when the waters diminiſhed: he never diſtinguiſhed the poſtdiluvian from the antediluvian, and therefore muſt have conſidered them as the ſame. Beſides, Noah himſelf did not believe that the ancient continents were deſtroyed, for he took the appearance of an olive-branch to be a ſign of the diminution of the flood; that he certainly believed to have grown on the ancient continent, and could not expect it to have ſhot up from the bottom of the ſea. M. de Luc indeed ſays, that this olive grew on an antediluvian iſland, and that theſe iſlands being part of the antediluvian ocean, were not flooded: but it is plain from the hiſtory, that Noah thought otherwiſe, or elſe he could not have inferred that the appearance of the olive was a ſign of the abatement of the waters. But where is it mentioned, or what renders it neceſſary to conclude that iſlands exiſted before the flood? If iſlands did exiſt, and were to eſcape the flood, ſo might their inhabitants alſo, in direct contradiction to the ſacred hiſtory. Would it not have been much more convenient for Noah, his family and animals, to have taken refuge in one of them, than to have remained pent up in the ark? Moreover, Moſes informs us, that at the ceſſation of the flood the fountains of the deep were ſtopped or ſhut up; therefore, in his apprehenſion, inſtead of the ancient continents ſinking into the deep, the waters of the abyſs flowed from their ſources upon thoſe continents, and again returned. See Kirwan's Remarks, *ubi infra*.

Mr. Whitehurſt in his "Inquiry into the Original State and Formation of the Earth," &c. (4to. 1786) has attempted to account for the univerſal deluge in the following manner. "It is a truth," he ſays, "univerſally known that all bodies expand with heat: and that the force or power of that law is unlimited; now, as ſubterraneous fire gradually increaſed, ſo in like manner its expanſive force increaſed, until it became equal to the incumbent weight. Gravity and expanſion being equally balanced, and the latter continuing to increaſe, every day, more and more, became ſuperior to the incumbent weight, and diſtended the ſtrata as a bladder forcibly blown. Now, if fire thus generated was ſurrounded by a ſhell or cruſt, of equal thickneſs, and of equal denſity, the incumbent weight muſt have been equal: on the contrary, if the ſurrounding ſhell, or cruſt, was unequally denſe, the incumbent weight muſt have been unequal. But ſince the primitive iſlands were protuberances gradually aſcending from the deep, the incumbent weight muſt have been unequal; for as the ſpecific gravity of ſtone, ſand, or mud, is ſuperior to that of water, we may thence conclude that the incumbent weight of the former muſt have been greater than that of the latter. Now the incumbent weight of the iſlands being greater than that of the ocean, the bottom of the ſea would conſequently aſcend by the expanſive force below, ſooner than the iſlands. The bottom of the ſea being thus elevated, the

incumbent water would flow towards the lefs elevated parts, and confequently the iflands would become more or lefs deluged, as the bottom of the fea was more or lefs elevated; and this effect muft have been more or lefs univerfal, as the fire prevailed more or lefs univerfally, in the fame ftratum, or in the central parts of the earth. But the tragical fcene ended not with an univerfal flood, and the deftruction of the terreftrial animals; for the expanfive force of the fire, ftill increafing, became fuperior to the incumbent weight and cohefion of the ftrata, which were then burft, and opened a communication between the two oceans of melted matter and water. The two elements coming thus into contact, and the latter becoming inftantaneoufly converted into fteam, would produce an explofion infinitely beyond all human conception. The terraqueous globe being thus burft into millions of fragments, and from a caufe apparently feated nearer to its centre than its furface, muft certainly have been thrown into a ftrange heap of ruins: for the fragments of the ftrata thus blown up could not poffibly fall together again into their primitive order and regularity: therefore an infinite number of fubterrancous caverns muft have enfued, at the diftance of many miles, or many hundreds of miles below the bottom of the antediluvian fea. Now it is eafy to conceive, when a body of fuch an immenfe magnitude as the earth, which is nearly 8000 miles in diameter, was thus reduced to an heap of ruins, that its incumbent water would immediately defcend into the cavernous parts thereof: and by thus approaching fo much nearer towards the centre than in its antediluvian ftate, much of the terreftrial furface became naked and expofed, with all its horrid gulphs, craggy rocks, mountains, and other diforderly appearances. Then the primitive ftate of the earth feems to have been totally metamorphofed by the firft great convulfion of nature at the time of the deluge: its ftrata broken, and thrown into every poffible degree of confufion and diforder. Hence thofe mighty eminences, the Alps, the Andes, the Pyrenées, and all other chains of mountains were brought from beneath the great deep. Hence the fea retiring from thofe vaft tracts of land, the continents, became fathomlefs, and environed with craggy rocks, cliffs, impending fhores, and its bottom fpread over with mountains and valleys like the land." Such is the manner in which Mr. Whitehurft endeavours to account for the univerfal deluge, which he confirms by numerous obfervations on petrifactions of marine animals, and on the fituations in which they are found.

In order to account for the great height of 15 *cubits* above the higheft mountains which the water of the deluge afcended, fir Henry Englefield communicated to Dr. Geddes (See Crit. Remarks, p. 71.) the following calculation. "The diameter of the earth being taken at 8000 miles, and the higheft mountains being fuppofed four miles high above the level of the fea," (which is more than the height of the Andes) "the quantity of water requifite to cover them will be an hollow fphere of 8008 miles diameter, and four miles thick; the content of which, in round numbers, is 800,000,000 cubic miles. Let us now fuppofe the globe of the earth to confift of a cruft of folid matter, 1000 miles thick, inclofing a fea or body of water 2000 miles deep; within which is a central nucleus of 2000 miles in diameter: the content of that body of water will be 109,200,000,000 cubic miles, or about 137 times the quantity of water required to cover the furface of the earth as above ftated. Now water, by experiment, expands about one 25th of its whole magnitude from freezing to boiling; or one-hundredth of its magnitude for 45 degrees of Fahrenheit's thermometer. Suppofe then, that the heat of the globe, previoufly to the deluge, was about 50 degrees of Fahrenheit's, a temperature very near that of this climate; and that a fudden change took place in the interior of the globe, which raifed its heat to 83 degrees; an heat no greater than the marine animals live in, in the fhallow feas between the tropics: thofe 33 degrees of augmented heat would fo expand the internal fea, as to caufe it to more than cover the furface of the globe, according to the conditions above-mentioned: and if the caufe of heat ceafed, the waters would of courfe, in cooling, retire into their former places. If the central nucleus be fuppofed 3000 miles, and the internal fea only 1500 miles deep, its content will then be 99,200,000,000 cubic miles, or 125 times the water required; and in that cafe, an additional heat of 36 degrees to the previous temperature of the earth, will be fufficient to produce the above-defcribed effect. It is fcarce neceffary to fay, that the perfect regularity here fuppofed to exift in the form of the interior parts of the globe, is of no confequence to the propofed hypothefis; which will be equally juft, if the above-given quantity of waters be any how difpofed within the earth. Neither is it here propofed to difcufs the reality of a central fire, which many philofophers maintain, and many deny. It may not be unworthy of remark, that the above hypothefis, which does not in any way contradict any law of nature, does fingularly accord with the Mofaic narrative of the deluge; for the fudden expanfion of the internal waters would, of courfe, force them up through the chafms of the exterior cruft in dreadful jets and torrents: while their heat would caufe fuch vapours to afcend into the atmofphere, as, when condenfed, would produce torrents of rain beyond our conception.

The ingenious Mr. Kirwan (fee Tranfactions of the Royal Irifh Academy, vol. vi.) confidering the fyftems of Burnet, Woodward, and Whifton, as having been repeatedly refuted, recurs to the account of this great revolution given by Mofes himfelf, taken in its plain literal fenfe, as the only one that appears perfectly confiftent with all the phenomena now known: he plainly afcribes it to a fupernatural caufe, namely, the exprefs intention of God to punifh mankind for their crimes. We muft therefore, he fays, confider the deluge as a miraculous effufion of water, both from the clouds and from the great abyfs; and he obferves, that if the waters, fituated partly within and partly without the caverns of the globe, were once fufficient to cover even the higheft mountains, as he has endeavoured to fhew in a former effay, they muft have been fufficient to do fo a fecond time when miraculoufly educed out of thofe caverns. Early geologifts, not attending to thefe facts, thought all the waters of the ocean infufficient: it was fuppofed that its mean depth did not exceed a quarter of a mile, and that only half of the furface of the globe was covered by it; and on thefe *data* Keill computed that 28 oceans would be requifite to cover the whole earth to the height of four miles, which he judged in confequence of Varenius's calculation to be that of the higheft mountains, a quantity at that time confidered as extravagant and incredible; but a farther progrefs in mathematical and phyfical knowledge has fince fhewn the different feas and oceans to contain at leaft 48 times more water than they were fuppofed to do. M. de la Place, calculating their average depth from a ftrict application of the theory of tides to the height to which they are known to rife in the main ocean, demonftrates that a depth, reaching only to half a league, or even two or three leagues, is incompatible with the Newtonian theory, as no depth under four leagues could reconcile it with the phenomena. The vindication of the Mofaic hiftory does not require near fo much. The extent of the fea is known to be far greater than Keill fuppofed, that of the earth fcarcely occupying $\frac{1}{4}$ of the furface of the globe. Kirwan, having eftablifhed the

the poſſibility and reality of the deluge, proceeds in his endeavours to trace its origin, progreſs, and ſtill permanent conſequences. That it originated in and proceeded from the great ſouthern ocean below the equator, and thence ruſhed on the northern hemiſphere, he takes to be a natural inference from the facts which he has adduced. Theſe facts are as follow: 1. The ſouthern ocean is the greateſt collection of waters on the face of the globe. 2. In the northern latitudes beyond 45° and 55° we find the animal ſpoils of the ſouthern countries, and the marine exuviæ of the ſouthern ſeas; but in the ſouthern latitudes we find no remains of animals, vegetables, or ſhells belonging to the northern ſeas, but thoſe only that belong to the neighbouring ſeas. 3. The traces of a violent ſhock or impreſſion from the ſouth are as yet perceptible in many countries. 4. The very ſhape of the continents, which are all ſharpened towards the ſouth, where they are waſhed by the Southern ocean, indicate that ſo forcible an impreſſion was made upon them as nothing but the mountains could reſiſt; ſuch are the Cape of Good Hope, Cape Comorin, the ſouthern extremity of New Holland, and that of Patagonia. To theſe geological proofs, Mr. Kirwan adds the tradition of the orthodox Hindoos, that the globe was divided into two hemiſpheres, and that the ſouthern was the habitation of dæmons, who made war upon the gods. (Aſiatic Reſearches, vol. iii.) This war is commonly thought to be an allegorical deſcription of the flood; and hence the olive-branch, denoting a diminution of the flood, became a ſymbol of peace. Did not Noah, our author adds, reſide on the borders of the ſouthern ocean, otherwiſe he could not ſee that the great abyſs was opened? And did not an inundation from the ſouth-eaſt drive the ark north-weſt to the mountains of Armenia? Theſe conjectures are at leaſt conſiſtent with the moſt probable notions of the primitive habitation of man, which Mr. Kirwan takes to be near the ſources of the Ganges (as Joſephus expreſsly mentions), the Burrampooter, and the Indus, from which, as the temperature grew colder, mankind deſcended to the plains of India.

This unparalleled revolution, as Moſes informs us, was introduced by a continual rain of 40 days; by which, our author conceives, the ſurface of the earth muſt have been looſened to a conſiderable depth, and the effects of which were in many inſtances deſtructive. This looſening and opening of the earth occurred in many places where the marine inundation ſtagnated; and thus ſhells and other marine exuviæ were introduced into the ſoil, which rendered it more fertile. This rain alſo diluted the ſalt-water, and ſerved to prevent its pernicious effects both to the ſoil and the freſh-water fiſh. The deſtruction of animals contributed to the ſame purpoſe, and might, in many inſtances, be neceſſary to fertilize a ſoil produced by the decompoſition of primary mountains: from the animals thus deſtroyed the phoſphoric acid found in many ores may have originated. But the completion of this cataſtrophe was undoubtedly effected, as Moſes ſtates, by the invaſion of the waters of the great abyſs; moſt probably, as our author apprehends, that immenſe tract of ocean ſtretching from the Philippine iſlands, or rather from the Indian continent, on the one ſide, to Terra Firma on the other, and thence to the ſouthern pole, and again from Buenos Ayres to New Holland, and thence to the pole. Tracing its courſe on the eaſtern part of the globe, we ſhall ſee it impelled northwards with reſiſtleſs impetuoſity againſt the continent which at that time probably united Aſia and America. This appears to have been torn up and ſwept away (except the iſlands that ſtill remain), as far north as latitude 40°: its farther progreſs appears to have been ſomewhat checked by the lofty mountains of China and Tartary, and thoſe on the oppoſite American coaſt; here it began to dilate itſelf over the collateral countries; the part checked by the Tartarian mountains forming, by ſweeping away the ſoil, the deſert of Coby, while the interior or middle torrent paſſed forward to the pole; but the interior ſurge being ſtill more reſtricted by the contiguous, numerous, and elevated mountains of eaſtern Siberia and America, muſt at laſt have ariſen to a height and preſſure which overbore all reſiſtance, daſhing to pieces the heads of theſe mountains, as Patrin and Steller remark, and bearing over them the vegetable and animal ſpoils of the more ſouthern ravaged or torn-up continents, to the far-extended and inclined plains of weſtern Siberia, where its free expanſion allowed it to depoſite them. Hence the origin of the bones and tuſks of elephants, and rhinoceri found in the plains, or inconſiderable ſandy or marly eminences in the north-weſtern parts of Siberia, as Mr. Pallas rightly judges. If now we return to the ſouth, and contemplate the effects of this overwhelming invaſion on the more ſouthern regions of India and Arabia, we ſhall, where the coaſts were undefended by mountains, diſcover it excavating the gulfs of Narquin, Tonquin, and Siam, the vaſt bay of Bengal, and the Arabian and Red ſeas. That the ſouthern capes, promontories, and headlands were extenuated to their preſent ſhape by the deluge, and not by tides or the currents ſtill obſerved in thoſe ſeas, may be inferred from the inefficacy of thoſe feebler powers to produce any change in them for many paſt centuries.

The chief force of the inundation, continues our author, ſeems to have been directed northwards in the meridian of from 110 to 200 E. of London. In the more weſtern tracts it appears to have been weaker. The plains of India are ſuſpected to have been leſs ravaged, or perhaps their ſubſequent fertility may have been occaſioned by their numerous rivers. As to thoſe of Arabia, their ſolid baſis, reſiſting the inundation, was obliged to yield its looſer ſurface, and remains even now a ſandy deſert, while the interior more mountainous tracts, intercepting, and thus collecting, the waſhed-off ſoil, are to this day celebrated for their fertility, as Niebuhr teſtifies. To a ſimilar tranſportation of the ancient vegetable ſoil, the vaſt ſandy deſerts of Africa, and the barrenneſs of moſt of the plains of Perſia may be attributed. The progreſs of the Siberian inundation was for ſome time ſtationary, on account of its confinement between the Altaiſchan elevation on the ſouth, and the Ouralian mountains on the weſt, and the circumpolar mountains on the ſide of Greenland. Hence ariſe the excavations obſerved on the northern parts of the former, and the abrupt declivities on the eaſtern flanks of the latter, while the weſtern diſcover none. The maſs of waters collected and ſpread over the arctic regions muſt have deſcended partly ſouthwards over the deſerts of Tartary, into countries with which we have not much acquaintance, ſo as to be able to trace its ravages; but from the oppoſition it muſt have met with in thoſe mountainous tracts, and the repercuſſion of their craggy ſides, eddies muſt have been formed, to which the Caſpian, Euxine, and other lakes may have owed their origin. Part alſo muſt have extended itſelf over the vaſt tracts of the Ourals, and then expanded more freely over the plains of Ruſſia and Poland, down to latitude 52°, where it muſt have been oppoſed by the inundation originating in the weſtern parts of the Pacific ocean, on this ſide of the Cape of Good Hope, and thence impelled northwards and weſtwards, in the ſame manner as the eaſtern inundation already deſcribed, but with much leſs force, and ſweeping the continents of South America (if then emerged), and of Africa, conveying to Spain, Italy, and France, and perhaps ſtill further

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further north, elephants and other animals and vegetables hitherto fuppofed partly of Indian and partly of American origin. That the courfe here affigned is not imaginary, appears from the fhells, vegetables, and animal remains of thofe remote climates, ftill found in Europe, and from the difcovery both of the European and the American promifcuoufly mixed with each other at Fez. So alfo in Germany, Flanders, and England, the fpoils of the northern climates, and thofe of the fouthern alfo, are equally found; thus the teeth of arctic bears, and bones of whales, as well as thofe of animals of more fouthern origin, have been difcovered in thofe parts.

The encounter of fuch enormous maffes of water in oppofite directions muft have produced a ftupendous effect; fuch as appears to have been fufficient for fhaking and fhattering fome of the folid vaults that fupported the fubjacent ftrata of the globe. To this concuffion Mr. Kirwan afcribes the formation of the bed of the *Atlantic*, which fee. The wreck of fo confiderable an integrant part of the globe muft neceffarily have convulfed the adjacent ftill fubfifting continents previoufly connected with it, rent their ftony ftrata, burft the ftill more folid maffes of their mountains, and thus in fome cafes framed, and in others prepared, the infular ftate to which thefe fractured tracts were reduced. To this event our author, therefore, afcribes the bold, fteep, and abrupt weftern coafts of Ireland, Scotland, and Norway, and the numerous ifles that border them, as well as many of thofe of the Weft Indies. The Britannic iflands feem to have acquired, fays Mr. Kirwan, their infular ftate at a later period, though it was probably prepared by this event; but the bafaltic maffes on the Scotch and Irifh coafts, and thofe of Feroe appear to him to have been rent into pillars by this concuffion. During this elemental conflict, and the crafh and ruin of the fubmerged continent, many of its component parts muft have been reduced to atoms, and difperfed through the fwelling waves that ufurped its place. The more liquid bitumens muft by the agitation have intimately mixed with them. They muft alfo have abforbed the fixed air contained in the bowels of the funk continent; and farther, by this continental depreffion, whofe derelinquifhed fpace was occupied by water, the level of the whole diluvial ocean muft have been funk, and the fummits of the higheft mountains muft then have emerged. In this ftate of things it is natural to fuppofe that if iron abounded in the fubmerged continent, as it does at this day in the northern countries of Sweden, Norway, and Lapland adjacent to it, its particles may have been kept in folution by the fixed air, and the argillaceous, filiceous and carbonaceous particles may have been long fufpended. Thefe muddy waters mixing with thofe impregnated with bitumen, the following combinations muft have taken place. 1. If carbonic matter was alfo contained in the water, this uniting to the bitumen muft have run into maffes no longer fufpenfible in water, and formed ftrata of coal. 2. The calces of iron by the contact of bitumen were in great meafure gradually reduced, and together with the argillaceous and filiceous precipitated on the fummits of feveral of the mountains not yet emerged, and thus formed bafaltic maffes, that during deficcation fplit into columns; in other places they covered the carbonaceous maffes already depofited, and by abforbing much of their bitumen rendered them lefs inflammable, and hence the connection which the fagacious Werner obferved between bafalts and coal. The fixed or oxygen air, erupting from many of them, formed thofe cavities, which being filled by the fubfequent infiltration of fuch of their ingredients as were fuperfluous to their bafaltic ftate, formed chalcedonies, zeoliths, olivins, bafaltines, fpars, &c. Hence moft of the mountains of Sweden that afford iron, afford alfo bitumen. Hence alfo the afphalt found with trap, and under bafalts, and in balls of chalcedony found in trap. This Mr. Kirwan conceives to be the laft fcene of this dreadful cataftrophe; and hence no fhells are found in thefe bafalts, thofe having been previoufly depofited, though fome other lighter marine vegetable remains have fometimes been found in them; fome argillaceous or fand-ftone ftrata may alfo have been depofited at this period.

To the Mofaic account it has been objected, that the countries near Ararat are too cold to bear olive-trees. Tournefort, who firft made this objection, fhould have recollected, that at this early period the Cafpian and Euxine feas were joined, as he himfelf has proved. This circumftance fitted a country lying in the 38th degree of latitude to produce olives, which now grow in much higher latitudes, at prefent chilled only by its diftance from the fea. (See ARARAT.) A more plaufible objection arifes from the difficulty of collecting and finding all the various fpecies of animals now known, fome of which can exift only in the hotteft, and others only in the coldeft climates. But it is not neceffary to fuppofe that any others were collected in the ark befides thofe moft neceffary for the ufe of man, and thofe only of the graminivorous or granivorous claffes; Mr. Kirwan fuggefting that the others were probably of fubfequent creation. At this early period ravenous animals were not only not neceffary, but would have been even deftructive to thofe who had juft obtained exiftence, and probably not in great numbers. They only became neceffary when the graminivorous had multiplied to fo great a degree that their carcaffes would have fpread infection. Hence our author is led to fuppofe that they were of pofterior creation; and to this circumftance he alfo attributes the exiftence of thofe that are peculiar to America, and the torrid and frigid zones. Among the fubfequent effects of the flood we may mention the following: the atmofphere muft have been exceedingly altered by its confequences. Soon after the creation of vegetables, and in proportion as they grew and multiplied, great quantities of oxygen muft have been thrown off by them into the atmofphere without any proportional counteracting diminution from the refpiration or putrefaction of animals, as thefe were created only in pairs and multiplied more flowly; hence it muft have been much purer than at prefent; and to this circumftance in a great meafure Mr. Kirwan inclines to afcribe the longevity of the antediluvians. After the flood the ftate of things was reverfed; the furface of the earth was covered with dead and putrefying land animals or fifh, which copioufly abforbed the oxygenous part of the atmofphere and fupplied only mephitic and fixed air: thus the atmofphere was probably brought to its actual ftate, containing little more than one-fourth of pure air, and nearly three-fourths of mephitic. Hence the conftitution of men muft have been weakened, and the lives of their enfeebled pofterity gradually reduced to their prefent ftandard. In order to avoid thefe exhalations it is probable that the human race continued for a long time to inhabit the more elevated mountainous tracts. Domeftic difturbances in Noah's family, briefly mentioned in the facred writings, probably induced him to move with fuch of his defcendants as were moft attached to him to the regions he inhabited before the flood, which Mr. Kirwan conceives to have been the vicinity of China, and to this circumftance he attributes the early origin of the Chinefe monarchy.

After all, whatever might be the inftrumental phyfical caufe of the deluge, and whatever might be the mode of its operation, we muft on this occafion have recourfe to a divine interpofition and energy. For though the waters which covered the earth at the creation might be fufficient to

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to cover it again, yet it is not eafy to conceive or fatisfactorily to explain, on any hypothefis, how this could be effected by mere natural means. The waters, which were fufpended in the clouds, might, indeed, defcend upon the earth, and that in cataracts, or fpouts of water, as the Septuagint interprets "the windows of heaven," and thus a great inundation might be occafioned in the lower grounds; but as the clouds could pour down no more water than they contained, which would foon be exhaufted, though it fhould feem, from the long continuance of rain, that the fhowers were rather moderate and gradual. The fubterraneous ftores would afford a more plentiful fupply, but it is difficult to account for their being raifed and perhaps more difficult afterwards to difpofe of and remove them. Whilft we are unable to affign any natural caufe that would be effectual for this purpofe, we may refolve it into the divine power, which might, on this occafion, fo far controul the ufual courfe of nature, as to effect this purpofe. And, indeed, the event was fo extraordinary, and the confequences fo confiderable, that it is very reafonable to believe, that God did, in a fpecial manner interpofe. Neverthelefs, we can by no means adopt the opinion of M. Buffon, that to attempt an explanation of the univerfal deluge and of its phyfical caufes; to pretend to give a detail of what paffed during this great revolution; and to conjecture what effects have refulted from it; indicate a prefumptuous defire of fcanning the power of the Almighty. The power of the Almighty was no lefs confpicuoufly and miraculoufly difplayed in the cataftrophe of the deluge, though in accomplifhing his purpofe, he directs and actuates the operation of phyfical caufes or fufpends and controuls any of the eftablifhed laws of nature. The inquiry into the *modus operandi*, conducted with modefty, and with a conftant regard to the Mofaic account of this extraordinary event, by no means implies a doubt, much lefs a difbelief of the agency of the omnipotent and all-wife fovereign of nature, nor juftifies thofe charges of infidelity, that have been too freely and uncandidly made on thofe who inveftigate this difpenfation of divine Providence. "It may ftill be urged," fays this ingenious writer, (Nat. Hift. by Smellie, vol. i. p. 131.) "that, as the univerfal deluge is an eftablifhed fact, is it not lawful to reafon upon its confequences? True. But you muft commence with acknowledging that the deluge could not poffibly be the effect of any phyfical caufe; you muft regard it as an immediate operation of the Deity; you muft content yourfelf with what is recorded in Scripture; and you muft, above all, avoid blending bad philofophy with the purity of divine truth. After taking thefe precautions, which a refpect for the counfels of the Almighty requires, what remains for examination, upon the fubject of the deluge? Do the facred writings tell us, that the mountains were formed by the deluge? They tell us the reverfe. Do they inform us that the agitation of the waters was fo great, as to raife the fhells from the bottom of the ocean, and to difperfe them over the face of the earth? No: the ark moved gently on the furface of the waters. Do they tell us, that the earth fuffered a total diffolution? By no means, the narration of the facred hiftorian is fimple and true; that of naturalifts is complicated and fabulous." See *Theory of the* EARTH, and STRATA.

DELVIN, in *Natural Hiftory*, a name fometimes given by the miners in Cornwall to that fort of talcy ftone or flate, which they more generally call *killas;* but in fome places, as at Lowancowiggan, they ufe it as the name of a coarfe, but very hard ftone, in which the ore lies. The ore is tin, and is confiderably rich there, but the hardnefs of the ftone makes it difficult to be got out.

DELVIN, in *Geography*, a town of European Turkey, in the province of Albania; 36 miles S. W. of Delfino.

DELVING, in *Agriculture*, a word which implies the operation of digging, or turning up the foil by means of a fpade.

DEMA, in *Geography*, a river of Ruffia, which runs into the Bielaia, at Upha.

DEMADES, in *Biography*, an Athenian orator, originally a mariner, was taken prifoner by Philip of Macedon: he was a man of corrupt principles, but was far-famed for his eloquence and powers of perfuafion. He checked king Philip in his immoderate exultation after the battle of Chæronea, charging him with acting the part of a Therfites, inftead of imitating the more noble conduct of an Agamemnon. Philip took the rebuke in good part and made Demades his confidential friend. He fided with the Macedonian party againft Demofthenes and the other patriots. When Alexander inflicted his vengeance upon Thebes, and demanded that the Athenians fhould deliver up the orators and leading men who were his oppofers, Demades completely diverted his wrath by obtaining a decree that the Athenians themfelves fhould punifh the guilty by their own laws, and he went at the head of an embaffy to Alexander, who received them with great affability and admitted the Athenians to his favour. Demades was feveral times fined for propofing edicts contrary to law, and was at one time declared infamous, and incapable of fpeaking in the public affembly. He however recovered his authority, and was the means of carrying the decree by which Demofthenes was condemned to death. So mercenary was Demades, that Antipater was accuftomed to fay, that of his two Athenian friends, he could get Phocion to accept of nothing, and could never fatisfy Demades. He was as profufe in fpending, as rapacious in acquiring a fortune. He at length paid the penalty of his crimes: being fufpected of a traitorous correfpondence with the enemies of his country, his letters were intercepted, and himfelf was condemned to death, having previoufly had the mortification of feeing his own fon killed. According to Cicero, Demades poffeffed in his fpeeches more of the Attic falt than any other orator. He was extremely ready at extempore addreffes and has occafionally fupported Demofthenes when that prince of fpeakers was thrown into confufion by popular tumult. A fpecimen of his ftrong and pointed manner of fpeaking is recorded upon the arrival of the news of Alexander's death. Demades refufed to give any credit to the report; "for," faid he, "if Alexander were dead, the whole world would fmell of the carcafe." Univer. Hift.

DEMAIA, in *Geography*, a town of Egypt; 6 miles N. W. of Manfora.

DEMAIN, or DEMESNE, in its popular fenfe, denotes the lord's manor-place, with the lands thereto belonging; which he and his anceftors have from time to time kept in their own manual occupation. See MANOR.

DEMAIN, or *Demefne*, in a law-fenfe, fignifies, according to Hottoman, patrimonium domini, the lord's patrimony; called alfo domain, and by the civilians, dominicum.

The fame author proveth thofe lands to be demain, which a man holdeth originally of himfelf; and thofe to be feodum, which he holdeth of a fuperior lord.

In England, no common perfon has any demain, fimply underftood; for all depends, either mediately or immediately, on the crown. When a man therefore, in pleading, would fignify his land to be his own, he faith, that he is or was feifed thereof in his demain, as of fee; whereby he means, that although his land be to him, and his heirs for ever, yet it is no true demain, but depends upon a fuperior lord, and he

he holdeth by ſervice, or rent in lieu of ſervice, or by both ſervice and rent. Lit. l. i. c. 1.

Demain is ſometimes alſo taken, more largely, for lands and tenements held for life, &c. and ſometimes more ſtrictly for ſuch only as are generally held in fee.

Demain is ſometimes again uſed for a diſtinction between thoſe lands that the lord of the manor has in his own hands, or in the hands of his leſſee, demiſed upon a rent, for a term of years or life; and ſuch other lands pertaining to the ſaid manor which belong to the free, or copy-holders.

The reaſon why the copy-hold is accounted demain, is becauſe they, who are tenants to it, are judged in law to have no other right but at the will of the lord; ſo that it is reputed ſtill, after a ſort, to be in the lord's hands; and yet in common ſpeech that is ordinarily called demain, which is neither free nor copy-free.

Demain, or *Demeſne*, again, is uſed in a more ſpecial ſignification, in oppoſition to frank-free lands.

Thus, thoſe lands, or manors, which were in the poſſeſſion of Edward the Confeſſor, or William the Conqueror, are called ancient demain, or demeſne; and all others are called frank-fee; and the tenants who hold any of theſe former lands, are called tenants in ancient demain; and the others, tenants in frank-fee, and alſo tenants at common law. The reaſon is, becauſe tenants in ancient demain cannot be ſued out of the lord's court. The tenants of theſe lands, under the crown, were not all of the ſame order or degree. Some of them, as Britton teſtifies (c. 66.), continued for a long time pure and abſolute villeins, dependent on the will of the lord; and thoſe who have ſucceeded them in their tenures now differ from common copy-holders in only a few points. (F. N. B. 228.). Others were in great meaſure enfranchiſed by the royal favour; being only bound in reſpect of their lands to perform ſome villein ſervices of the better ſort, which were determinate and certain; as, to plough the king's land for ſo many days, to ſupply his court with ſuch a quantity of proviſions, or other ſtated ſervices; all which are now changed into pecuniary rents; and in conſideration of theſe, they had many immunities and privileges granted them (4 Inſt. 269.); as, to try the right of their property in a peculiar court of their own, called a court of ancient demeſne, by a peculiar proceſs denominated a writ of "right cloſe;" not to pay toll or taxes; not to contribute to the expences of knights of the ſhire; not to be put on juries; and the like. (F. N. B. 11. 14.) Theſe tenants therefore, though their tenure be abſolutely copyhold, yet have an intereſt equivalent to a freehold; and lands holden by this tenure are a ſpecies of copyhold, and as ſuch preſerved and exempted from the operation of the ſtatute of Charles II.; yet they differ from common copyholds, principally in the forementioned privileges; and they differ from freeholds by one ſpecial mark of villenage, noted by Bracton, and remaining to this day; *viz.* that they cannot be conveyed from man to man by the general common law conveyances of feoffment, and the reſt; but muſt paſs by ſurrender to the lord or his ſteward, in the manner of common copyholds; with this diſtinction however, that in the ſurrender of theſe lands in ancient demeſne, it is not uſed to ſay "to hold at the will of the lord" in their copies, but only "to hold according to the cuſtom of the manor."

Demain, or *Demeſne*, lands of the crown, *terræ dominicales regis*, denote either the ſhare reſerved to the crown in the diſtribution of landed property, or ſuch as came to it afterwards by forfeitures or other means, which were anciently very large and extenſive; compriſing divers manors, honours, and lordſhips; the tenants of which had very peculiar privileges. At preſent they are contracted within a very narrow compaſs, having been almoſt entirely granted away to private ſubjects. This has occaſioned the parliament frequently to interpoſe; and, particularly, after king William III. had greatly impoveriſhed the crown, an act paſſed (1 Ann. ſt. 1. c. 7.) whereby all future grants or leaſes from the crown for any longer term than 31 years or three lives are declared to be void; except with regard to houſes, which may be granted for 50 years. And no reverſionary leaſe can be made, ſo as to exceed, together with the eſtate in being, the ſame term of three lives or 31 years; that is, when there is a ſubſiſting leaſe, of which there are 20 years ſtill to come, the king cannot grant a future intereſt, to commence after the expiration of the former, for any longer term than 11 years. The tenant muſt alſo be made liable to be puniſhed for committing waſte; and the uſual rent muſt be reſerved, or, where there has uſually been no rent, one-third of the clear yearly value. The rents and profits of the demeſne lands of the crown conſtitute one branch of the king's ordinary revenue.

DEMAND, in its proper ſenſe, denotes a calling for, or requiring one's due.

Demand in *Law*, has a more ſpecial ſignification, as contradiſtinguiſhed from plaint: for all civil actions are purſued either by demands or plaints; according to which the purſuer is called either demandant or plaintiff; *viz.* in real actions, demandant; and in perſonal actions, plaintiff.

Where the party purſuing is called demandant, the party purſued is called tenant; and where the former is called plaintiff, the latter is termed defendant.

There are two kinds of demands: the one in deed, *de facto*, as in every precipe; the other in law, *de jure;* ſuch is entry in land, diſtreſs for rent, &c.

As an entry on land, and taking a diſtreſs, are a demand in law of the land and rent, ſo the bringing of an action of debt for money due on an obligation is a demand in law of the debt. (1 Litt. 432. 1 Nelſ. Abr.) Debts, claims, &c. are to be *demanded* and made in time, by the ſtatute of limitations; (21 Jac. 1. c. 16.) and other ſtatutes; or they will be loſt by law. A demand muſt be legal, and made in ſuch a manner as the law requires: if it be for rent of a meſſuage and lands, it ought to be made at the meſſuage, at the fore door of the houſe, the moſt notorious place; where lands and woods are let together, the rent is to be demanded on the land, as the moſt worthy thing, and on the moſt public part thereof: if wood only be leaſed, the demand muſt be made at the gate of the wood, &c. (1 Inſt. 201. Poph. 58.)

If a man releaſe another from all demands, it is the beſt releaſe the releaſee can have, and ſhall redound moſt to his advantage: for all executions, and all freeholds, and inheritances, executory, are releaſed. A releaſe of facts is more large than of quarrels or actions; and a releaſe of demands more large and beneficial than either: by a releaſe of all demands to the diſſeiſor, the right of entry into the land, and all contained therein, is releaſed; and he that releaſeth all demands, excludes himſelf from all actions, entries, and ſeizures. But it is no bar to a writ of error to releaſe an outlawry. 8 Co. 153, 154.

DEMANDANT, Petens, he who is actor, or plaintiff, in a real action; thus called, becauſe he demands lands, &c.

DEMANOVO, in *Geography*, a great cavern in a lime-ſtone rock, near the town of Pribilini in Hungary. This is the cave of which Bruchman, in his Epiſtola Itineraria, Ep. 77. aſſerts, that it is full of bones, and out of which was taken the ſkeleton of the dragon belonging to the king of Saxony at Dreſden. Townſon's Hungary.

DEMARATUS, in *Biography*, king of Sparta, ſucceeded his father Ariſto: and had, almoſt as ſoon as he aſcended

the throne, to encounter the violent meaſures of Cleomenes his colleague, who, in revenge, endeavoured to perſuade the Lacedæmonians that he was not the real ſon of Ariſto, and, of courſe, had no right to the crown which he wore. The oracle was applied to, to determine the queſtion, which Cleomenes had found means to corrupt. The deciſion was againſt Demaratus, and he was depoſed: he was, however, too much of a philoſopher to be greatly diſturbed at being reduced to the ſtate of a private life: he ſubmitted to his fate with becoming dignity, and was ever willing to ſerve his country in ſubordinate offices. Demaratus was alſo celebrated for his activity in athletic exerciſes, and is ſaid to have been the only ſovereign of Sparta who gained a prize at the Olympic races. Owing to ſome inſults which he met with from his ſucceſſor, he determined to quit Sparta, and retire into Aſia. He was received with kindneſs by Darius Hyſtaſpis, about the year 492, B. C. who treated him in a manner becoming his former royal rank, and made him great preſents. At the death of Darius, his friend and protector, he is ſaid to have aſſiſted Xerxes in the ſucceſſion: he was, however, ſtill ſo firmly attached to his country, that when he underſtood meaſures were taken by the Perſians to injure it, he communicated the buſineſs, by means of a pair of writing tables, on the wood of which he had cut an account of the fact, and covered the letters over with wax. Little more is known of Demaratus, except that his family flouriſhed in Perſia many generations with reſpect and honour. Another perſon of the ſame name was a citizen of Corinth, and is quoted by many of the ancients as the author of ſeveral treatiſes. Plutarch, in his own diſcourſe on rivers, refers to one on the ſame ſubject by Demaratus. Moreri.

DEMARCHUS, in *Antiquity*, the chief of a region, or diſtrict, in the country of Attica.

The Athenians divided their country into certain regions, or diſtricts, which they called δημοι, *i. e. people*; and eſtabliſhed a magiſtrate at the head of each, under the denomination of δημαρχος, *demarchos*, of δημος, and αρχη, *rule, government*.

It was alſo an appellation given to the chief magiſtrate of the city Neapolis.

DEMAVEND, in *Geography*, a town of Perſia, in the province of Irak; 170 miles E. of Amadan.

Demavend is alſo a range of mountains in Perſia, dividing Hyrcania from Parthia, according to Chardin; that is, in other words, the mountains of Mazendran. D'Anville marks Demavend due W. of Iſpahan, and it is repreſented as one of the chief elevations, which affords a proſpect of 50 farſangs, or 200 miles.

DEMBEA, a province of Abyſſinia, near a lake of the ſame name, ſituated between 11 degrees and 12 degrees N. lat. and 36 and 37 degrees E. long. below the mountains bounding Gueſqué and Kuara. This low province, and Woggora, a ſmall high province on the eaſt, are all ſown with wheat, and are the granaries of Abyſſinia. Dembea, according to Mr. Bruce, ſeems once to have been occupied entirely by the lake. It is called Atté-Kolla, the king's food, or maintenance; its produce being aſſigned for the ſupply of the king's houſehold. It is governed by an officer called Cantiba; whoſe poſt is lucrative; but he is not reckoned one of the great officers of the empire, and has no place in council.

Dembea, or Tzana, a lake of Abyſſinia, which is the largeſt expanſe of water known in that country. Its extent, however, ſays Mr. Bruce, (Travels, vol. iii. p. 387.) has been greatly exaggerated. Its greateſt breadth, from Dingleber to Lamgué, in a line nearly E. and W. is 35 miles; but it decreaſes much at each extremity, where it is not in ſome places above 10 miles broad. Its greateſt length is from Bab Baha to a little S. W. by W. of that part where the Nile, after having croſſed the end of it by a current always viſible, turns towards Dara, in the territory of Alata, which is 49 miles from N. to S. and which is the extent of this lake in length. In the dry months, from October to March, the lake very much ſhrinks in ſize; but after all the rivers on every ſide of it are filled, and have fallen into the lake, like radii drawn to a centre, it then ſwells, and extends itſelf into the plain country, and of courſe has a much larger ſurface. It contains, according to the fabulous reports of the Abyſſinians, 45 inhabited iſlands; but Mr. Bruce conceives the number to be about 11; the principal of which is Dek, or Daga, ſignifying a hill or high ground, nearly in the middle of the lake. Other iſlands are Halimoon nearer Gondar, and Briguida nearer Gorgona. All theſe iſlands were formerly uſed as priſons for the great people, or for a voluntary retreat on account of ſome diſguſt or great misfortune, or as places of ſecurity to depoſit their valuable effects, during troubleſome times. When Mr. Bruce was in Abyſſinia, 1300 ounces of gold, confided by the queen to Welleta Chriſtos, her governor of Dek, a man of extraordinary ſanctity, who had faſted for 40 years, was ſtolen away by that prieſt, who fled and hid himſelf; but the queen would not ſuffer him to be ſearched after or apprehended.

DEMEMBRE', in *Heraldry*, is when an animal is diſmembered, *i. e.* the limbs cut off its body.

DEMER, in *Geography*, a river of France, which has its ſource in the department of the Lower Meuſe, to the weſt of Maeſtricht, paſſes by Dieſt, Sickem, and Aerſchot, and falls into the Dyle, between Louvain and Malines. Timber and firewood are ſent by the Demer to Malines, Antwerp, and Bruſſels from Dieſt, but the boats or floats muſt be haled.

DEMERARA, a river of South America, in the country called Dutch Guiana or Surinam, which after a ſhort courſe diſcharges itſelf into the Eſquivo. The mouth of this river is defended by fort William Frederic; and the Dutch have formed a ſettlement on its banks, near which the inhabitants cultivate ſugar, cotton, and coffee. This river is about two miles wide at its mouth, oppoſite to the fort on its eaſt bank; and nearly a mile wide, 12 miles above the fort; its courſe is from S. to N., and it is navigable about 200 miles for veſſels that can paſs the bar at its mouth, which is a mud bank, not having above 24 feet at the higheſt water. The fort, properly ſupplied with men and ammunition, might be able effectually to guard its entrance. Staebroeck, the ſeat of government, is ſituated on the eaſt ſide of the river, $1\frac{1}{2}$ mile above the fort. The diſtrict of Demerara, together with Eſſequibo, form one government, and have the ſame court of police, but each has a ſeparate court of juſtice. The two diſtricts contain about 3000 whites, and 40,000 ſlaves. The river paſſes through the diſtrict, and whilſt it was in the poſſeſſion of the Dutch, was uſually viſited by 40 or 50 large ſhips from Holland, which often made two voyages in a year, beſides more than 250 ſmaller veſſels, under the Dutch and other flags. The plantations are regularly laid out in lots along the ſhore, called façades, about one-fourth of a mile wide, and extending three-fourths of a mile back into the country. Each lot includes about 250 acres, containing, when fully cultivated, 120,000 cotton trees, yielding generally at an average half a pound each tree, and employing 120 negroes. The ſhores of the rivers and creeks are chiefly planted with coffee, to the diſtance of about 30 miles from the ſea; from thence to the diſtance of 30 miles further, the ſoil becomes clayey and more fit for ſugar. Beyond this, the fineſt kinds

of

of wood, for building, furniture, &c. are obtained. N. lat. 6° 40′. W. long. 57° 45′.

DEMEROSESA, in *Ancient Geography*, a town of the iſland of Albion, ſuppoſed by Gale to be Dumfries.

DEMERSUM Folium. See Leaf.

DEMESNE, in *Law*. See Demain.

DEMETÆ, in *Ancient Geography*, were inhabitants of South Wales, ſeated, according to Ptolemy, next to the Silures, and poſſeſſed that part of the country, which is now divided into Caermarthenſhire, Pembrokeſhire, and Cardiganſhire; to which Baxter thinks Brecknockſhire and Radnorſhire ſhould be added. This country is called by ſome of the moſt ancient of our monkiſh writers, Demetia, from the name of its inhabitants; and it is not improbable, that they and their country derived their name from "Deveit," or Defaid, which ſignifies ſheep, which very much abounded in thoſe parts. As neither Pliny, Tacitus, nor any ancient writer, except Ptolemy, mentions any other nation in South Wales but the Silures, it ſeems probable that the Demetæ were generally conſidered as a part of that nation, and were perhaps their Cangi, or the keepers of their flocks and herds. Admitting this conjecture, the Demetæ were perhaps that nation of Cangians that were ſubdued by Oſtorius Scapula, after he had defeated the Iceni. For the country of theſe Cangians reached to the Iriſh ſea, which very well agrees with the ſituation of Demetia, (Tacit. An. l. xii. c. 33). As the Demetæ did not reſiſt the Romans with much obſtinacy, and as their country lay in a remote corner, and was then, and long after, very wild and uncultivated, it ſeems to have been little frequented by theſe conquerors, who had very few towns or ſtations within its limits. As none of the journies of Antoninus lay through any part of the country of the Demetæ, no place in that country is mentioned in the Itinerary. Ptolemy takes notice of the promontory Octapitarum, now St. David's Head, at the mouth of the river Tobius, now the Towy in Caermarthenſhire, and of the towns Luentium or Luentinum, now Llan-Ddewy-Brevy, in Cardiganſhire, near which Roman coins and bricks have been found, and Maridunum, now Caermarthen. The country of the Demetæ was ſituated in the Roman province called Britannia Secunda.

DEMETRIA, Δημητρια, in *Antiquity*, a feſtival in honour of Ceres, called by the Greeks *demeter*, δημητηρ, of δη, *i. e.* γη, *earth*, and μητηρ, *mother*. It was uſual on this occaſion for the worſhippers to laſh themſelves with whips made of the bark of trees, and called μυροπτοι. Pott. Archæol. Græc. tom. i. lib. ii. cap. 20. p. 379.

Demetria was likewiſe the name of another feſtival celebrated by the Athenians in honour of Demetrius Poliorcetes, and was the ſame with that afterwards called Dionyſia. Pott. loc. cit.

DEMETRIAS, in *Ancient Geography*, a town of Greece, in Theſſaly.—Alſo, a name given to the town of Sicyonia.—Alſo, a town of Aſia, in Syria, ſituated near to and eaſt of the Mediterranean ſea.—Alſo, a town of Aſia, now *Kerkouk*, near the mountains and S.S.E. of Arbela. It is called *Corcura* by Ptolemy.

DEMETRIUM, a place of Theſſaly, near the Pelaſgian gulf, where was a grove ſacred to Ceres.—Alſo, a port in the northern part of the iſle of Samothrace, near the promontory of the ſame name.

DEMETRIUS I. in *Biography*, ſurnamed Poliorcetes, king of Macedon, was ſon of Antigonus, a captain under Alexander the Great, and one of his ſucceſſors. He was born about the year 340 B.C. In one of his firſt military eſſays he was unſucceſsful. Ptolemy having invaded Syria, Demetrius was ſent with an army to oppoſe him, and was completely defeated at Gaza. Soon after, another opportunity was given him of retrieving his character which he did by vanquiſhing Ptolemy's general, taking him priſoner, with his camp and military treaſures. Towards the conquered he behaved with much kindneſs and generoſity. Demetrius afterwards made an expedition into Arabia. He next drove Seleucus from Babylon, laid waſte the country, and, returning, obliged Ptolemy to raiſe the ſiege of Halicarnaſſus. A treaty was immediately entered into between Antigonus and the princes confederated againſt him, which was ſoon broken; and Demetrius from this time ſet himſelf to deliver Greece from the tyranny under which it had long laboured. He landed at Athens, and after various ſucceſs he aſſembled the people, and ſolemnly reſtored their ancient democratic government; giving them, at the ſame time, large preſents of corn, timber, and other things of which they ſtood moſt in need. The Athenians in return for this liberality inveſted their benefactors with the higheſt honours; rendering them the homage due to guardian deities, and appointing a prieſt to ſerve them. From Greece, Demetrius proceeded to carry on another war againſt Ptolemy. He raiſed an army in Cilicia, and aſſembling a numerous fleet, proceeded to Cyprus. Here he defeated Menelaus the brother of Ptolemy, and beſieged him in the town of Salamis. Ptolemy came with a large fleet in aid of his brother, and a naval engagement enſued, in which the whole force of Ptolemy was almoſt entirely deſtroyed, and he was obliged to return to Egypt with eight galleys only. The whole iſland, with all the warlike ſtores and magazines, fell into the hands of the victor: and Menelaus and his ſon were among the priſoners; but theſe, with a genuine greatneſs of mind, he liberated without a ranſom. Antigonus henceforth aſſumed the title of king, and gave it alſo to his ſon. Among the female captives was Lamia, a celebrated courtezan, who captivated the heart of Demetrius, and who long retained over him a complete aſcendency. His gallantry, however, never permitted him to forget the buſineſs of war. He was an able mechanician, and applied his knowledge to the conſtruction of military engines, that were particularly uſeful to him in the various ſieges which he undertook, and in which he was generally ſucceſsful; though at Rhodes his ſkill was baffled, and he was obliged to retire after he had continued before the place more than a year. From Rhodes he went again to the aſſiſtance of the Athenians againſt Caſſander. In this inſtance, as before, his ſucceſs was perfect, and he reſtored liberty to all the Greek ſtates ſouth of Thermopylæ. He then took up his quarters at Athens, where his good fortune, and the high reputation which he had acquired, drew from the citizens the moſt ſervile adulation, which incited him to all kinds of extravagance and the groſſeſt debauchery. His influence with the Athenians cannot be better ſhewn than by obſerving, that when he demanded to be initiated into their myſteries, which could only be done at certain periods of the year, they actually changed the names of two of their months to accommodate his wiſhes. Demetrius was called from Greece by his father, againſt whom a league was formed by Caſſander, Seleucus, and Lyſimachus. In the battle of Ipſus, B.C. 301, his impetuoſity led him into difficulties, and he was glad to retreat to Epheſus, from which place he embarked for Greece, intending to proceed to Athens, but that city, which but a ſhort time before had paid him a kind of adoration due only to a celeſtial being, refuſed him admittance, and diſmiſſed his wife with her retinue. This event affected him very much, and he blockaded Athens, which after enduring the horrors of famine ſubmitted. He treated the vanquiſhed city with an unexpected lenity, and preſented it with a large ſupply of corn,

corn. After other exploits he was applied to by Alexander, the ſon of Caſſander, lately dead, to aſſiſt him againſt his brother Antipater: whether he rendered him any effectual aid does not appear, but it is certain that at the inſtigation of Demetrius, Alexander himſelf was aſſaſſinated at a banquet; and the baſe action was rewarded by ſucceſſion to the throne of Macedon. In this high ſtation he acted ſo imprudently, and with ſo little attention to the intereſts of his ſubjects, that after ſix years he was obliged to abandon the robes of royalty, and the kingdom over which he had reigned. The changes to which Demetrius was ſubject during the remainder of his life were very great; ſometimes at the head of powerful armies, at others left without a ſingle attendant. At length he was made priſoner by Seleucus, who kept him under a ſtrict guard in a caſtle in the Syrian Cherſoneſus. In this ſituation he had the affecting conſolation of finding his own ſon, Antigonus, offering himſelf an hoſtage for the freedom of his father. Demetrius abandoned himſelf to drinking to diſpel the trouble and melancholy of captivity, which brought on diſeaſes that terminated his life in his fifty-fourth year. His remains were conveyed to Greece, where his funeral was celebrated with every circumſtance of ſolemn pomp. His poſterity filled the throne of Macedon till Perſes was conquered by the Romans. Demetrius was remarkable, as has been ſeen, for the ſplendour of his character, and the variety of his fortune. Univer. Hiſt.

Demetrius II. king of Macedon, grandſon of the former, and ſon of Antigonus, who, we have ſeen, offered himſelf a ranſom for his father's freedom. In his youth he was diſtinguiſhed for his valour, and when he aſcended the throne, he was chiefly occupied in war with barbarous nations on the frontiers of his own dominions. He died B. C. 232, leaving the crown to his ſon Philip, then an infant.

Demetrius I. king of Syria, ſurnamed *Soter*, ſon of Seleucus Philopater, was ſent hoſtage to Rome by his father, on whoſe death Antiochus Epiphanes, and after him his ſon Antiochus Eupator, the one the uncle, the other the couſin of Demetrius, uſurped the throne of Syria. Demetrius in vain ſought of the Roman ſenate liberty to return to his own country to aſſert his rights; what was refuſed to him as a right, he contrived to effect by ſtratagem; he made his eſcape from Rome with the aſſiſtance of Polybius the hiſtorian, and landed in Syria. He was acknowledged as ſovereign, and ſecured his crown by the death of Eupator, who fell into his hands. He freed the Babylonians from the tyrannical rule of two brothers, whom Antiochus had placed over them, on which account he was entitled *Soter*, or Saviour. He ſent his armies againſt the Jews, in order to make Alcimus high-prieſt, and in this conteſt Judas Maccabæus loſt his life. By his own conduct he united againſt him the kings of Cappadocia, Pergamus, and Egypt; in battle he was at firſt ſucceſsful, but his want of prudence rendered him obnoxious to his own ſubjects, who deſerted him in the hour of danger, and he loſt his life in battle, in the year B. C. 150.

Demetrius II. ſurnamed *Nicanor*, the ſon of the preceding, was placed on his father's throne by Ptolemy Philometor, king of Egypt, whoſe daughter Cleopatra he married. No ſooner had he obtained the quiet poſſeſſion of the crown, than he abandoned himſelf to every kind of diſſipation and licentiouſneſs, and left the management of his affairs to flatterers and paraſites. He afterwards formed an alliance with the Jews, and marched to the Eaſt, where he was taken priſoner by the king of Parthia, who beſtowed his daughter upon him in marriage, which ſo enraged Cleopatra, his former wife, that ſhe married her brother-in-law, who laid claim to, and obtained the throne for himſelf. Shortly after he fell in battle, when Demetrius recovered the kingdom of Syria. By the wickedneſs and cruelty of his conduct, he became univerſally hated, was driven from his throne, and at laſt put to death, by command of his wife Cleopatra, at Tyre, whither he had fled for refuge and ſafety. Univer. Hiſt.

Demetrius Phalereus, a philoſopher of the peripatetic ſect, and diſciple of Theophraſtus. About the year 317 B. C. he was appointed by Caſſander, king of Macedon, to the government of Athens, which he conducted for ten years with ſo much wiſdom and moderation, that he is ſaid to have obtained the honour of 360 brazen ſtatues, erected in remembrance of his juſtice and of the improvements introduced by him into the finances, and the public buildings with which he had ornamented the city. He afterwards fell into diſgrace, and his life being in imminent danger, he fled to the court of Ptolemy Soter, king of Egypt, who received him with marked reſpect; but diſapproving the advice he gave him, with reſpect to the choice of a ſucceſſor, the young prince, Philadelphus, retained a fixed enmity againſt him; ſo that upon the death of this king, Demetrius was baniſhed to a diſtant province, where he loſt his life by the bite of an aſp. He died about the year 284. Some have ſaid, without ſufficient authority, that he was librarian to Ptolemy Philadelphus, and that by his advice this prince gave orders for a verſion of the Jewiſh Scriptures from the Hebrew into the Greek language. He was author of a vaſt number of books in proſe and verſe, on philoſophy, hiſtory, politics, criticiſm, and rhetoric, but time has deſtroyed them all. The elegant piece, "De Interpretatione," which ſome have aſcribed to him, is probably a work of later date.

Demetrius Phalereus lived at a period ſucceeding that of Demoſthenes, when Greece loſt her liberty and eloquence, and of courſe languiſhing, relapſed again into the feeble manner introduced by the Rhetoricians and Sophiſts. However, he attained ſome character: but he is repreſented as a flowery, rather than a perſuaſive ſpeaker, who aimed at grace rather than ſubſtance. "Delectabat Athenienſes," ſays Cicero, "magis quam inflammabat." "He amuſed the Athenians, rather than warmed them." After his time we hear of no more Grecian orators of any note. Diogenes Laertius, lib. v. Brucker's Hiſt. Phil. by Enfield, vol. i.

Demetrius, a Cynic philoſopher, who flouriſhed at Corinth in the firſt century. During the reign of Caligula, he taught philoſophy at Rome, where he obtained the higheſt reputation for wiſdom and virtue. When Nero ſucceeded to the crown, Demetrius was baniſhed for his inflexible integrity and zeal in reproving the manners of the age. At his death he was recalled, but was again baniſhed for the boldneſs of his language. A high teſtimony to the character of Demetrius is given by Seneca, who ſays, "leaving the nobles clad in purple, I converſe with, and admire the half-naked Demetrius; and why do I admire him, but becauſe I perceive, that in the midſt of his poverty he wants nothing! When I hear this excellent man diſcourſing from his couch of ſtraw, I perceive in him, not a preceptor only, but a witneſs of the truth, and I cannot doubt, that Providence has endowed him with ſuch virtues and talents, that he might be an example, and a monitor of the preſent age." Moreri. Brucker's Hiſt. of Phil. by Enfield.

DEMEU, in *Geography*, a ſmall town of France, in the department of the Gers; ſix miles W. of Vic ſur Loſſe.

DEMI, in *French Muſic*, is equal to ſemi in the Engliſh, and in compoſition of the ſame import as ſemi, Lat. implying half any quantity or ſubſtance. Demi-god, half-mortal, half-divine.

Semi-quaver, half a quaver, in muſic. Demi-ſemi-quaver, half a ſemi-quaver, a note in muſic with a black head, and three hooks, or three ties to the tails.

Demi or ſemi is half the ſubſequent word.

Demi, or Demy, in *Heraldry*, ſignifies the half of a thing; as, a demy lion, &c.

Colombiere has what he calls croix & demy, a croſs and a half; being a ſhaft croſſed in the upper part like the Calvary croſs, and having but one arm at the lower part.

Demi-Air, or Demi-Volt, in *Horſemanſhip*, is one of the ſeven artificial motions of a horſe; being an air, in which his fore-parts are more raiſed than in terra à terra: but the motion of the horſe's legs is more quick in the latter than in the demi-volt.

DEMIANKA, in *Geography*, a river of Ruſſia, which runs into the Irtiſch, near Demianſkoi.

DEMIANSKOI, a town of Ruſſia, in the government of Tobolſk, ſituated at the conflux of the Demianka and Irtiſch, 100 miles N.N.E. of Tobolſk. N. lat. 59° 35′. E. long. 69° 22′.

Demi-Bastion, ſhould literally imply "half a baſtion," but ſuch would be a very weak defence, on account of the extreme acuteneſs of the angle preſented exteriorly at the point of diviſion; which would, if mathematically done, be effected by a line drawn from the centre of the polygon to the flanked angle, along the capital of the baſtion. To remedy this, the gorge is extended ſo as rather to exceed, than to be under, the meaſurement of the greateſt diameter; ſome make the gorge equal to the length of the face, by which means the new face, or capital, becomes an *acute*, inſtead of an *obtuſe* angle therewith.

Demi-baſtions are chiefly found in *horn-works*, and *crown-works*, and in the various junctions of faces, appertaining to regular fronts, with redans, and other irregular portions; eſpecially where they break off from the defence of land ſides, to the defence of rivers, &c. By this means the inland defences are preſerved in ſyſtematic order; while due advantage is taken of the form or height of a bank, &c. See Fortification.

Demi Cannon, a piece of ordnance, uſually about ſix inches bore, 5400 pounds weight, ten or eleven feet long, and carrying a ſhot of 30 or 32 pound weight.

It carries point-blank 150 paces; its charge of powder is 14 pound weight.

There are alſo two ſizes of demi-cannon above this, which are ſomething larger; as, the ordinary demi-cannon, which is ſix inches $\frac{1}{6}$ bore, twelve feet long, weighing 5600 pounds; its charge of powder 17 pounds 8 ounces; it carries a ſhot ſix inches and a half diameter, whoſe weight is 32 pounds: this piece ſhoots point-blank 162 paces.

Demi-cannon of the largeſt ſize, is 6 inches $\frac{6}{8}$ bore, twelve feet long, 6000 pounds weight; its charge is 18 pounds of powder, and it carries 180 paces. See Cannon, and Ordnance.

Demi-Cross, an inſtrument uſed by the Dutch to take the ſun's altitude, or that of a ſtar, at ſea; but inſtead of which we uſe the croſs-ſtaff or fore-ſtaff. See *Plate* V. *Aſtronomy*, *fig.* 46.

The ſtaff, A G, is graduated eaſily, being only a line of whole tangents, whoſe radius is E B, the length of the croſs-piece, or tranſom. It hath three vanes; a horizontal vane, as A; a ſight vane, as H; and the ſhade vane, as E.

When the vanes are on the ſtaff and croſs-piece, to take the ſun's altitude, hold the inſtrument with the tranſom as upright as you can, and looking through the ſight vane, as H, look for the horizon through the ſlit in the horizon vane, and then ſlide the croſs-piece or tranſom to and fro, till you make the ſhade of the vane at E to fall at the ſame time upon the ſlit of the horizon vane, and alſo at A; then are the degrees cut on the ſtaff, by the edge of the croſs-piece, the ſun's altitude required. But to take the height of a ſtar, you muſt remove the horizon vane, A, and put it on the end G, and transfer the ſight vane H to A; then holding up the inſtrument as before, looking through the ſight vane, ſee for the horizon through the horizon vane, and for the ſtar by the ſhade vane, ſliding the tranſom to and fro, till the horizon and ſtar are both ſeen by their reſpective vanes, and then the tranſom will cut the degrees of the ſtar's altitude on the ſtaff, allowing about eight or ten minutes for your height above the level of the water, as muſt be done in all ſuch caſes.

Demi-Culverin, is a piece of ordnance commonly $4\frac{1}{2}$ inches bore, ten feet long, 2700 pounds weight; its charge is 7 pounds 4 ounces of powder; and it carries a ſhot of 10 pounds 11 ounces, and ſhoots point-blank 175 paces.

Demi-culverin of the leaſt ſize, is $4\frac{1}{4}$ inches bore, ten feet long, 2000 pounds weight; it carries a ball of 4 inches diameter, its charge is 6 pounds 4 ounces of powder, and its level range is 174 paces.

Demi-culverin of the largeſt ſort, is 4 inches $\frac{6}{8}$ bore, ten feet long; its charge of powder is 8 pounds and 8 ounces; the ball is $4\frac{1}{2}$ inches diameter, weighs 12 pounds 11 ounces; and the point-blank ſhoots 178 paces. See Cannon and Ordnance.

Demi-Ditone, in *Muſic*, is uſed by ſome for a third minor.

Demi Gods, in *Mythology*, thoſe fabulous beings that were ſuppoſed to be produced by the connexion of gods with women, or of goddeſſes with men; of theſe there was a prodigious number, whoſe temples were diffuſed over the whole earth, and whoſe worſhip, though leſs ſolemn than that of the gods, formed a conſiderable part of the Pagan religion. See Genii, God, Heroes, Idolatry, and Theogony.

Demi-Gorge of a baſtion, is the half of the *gorge*, or neck of the baſtion, meaſured in a right line from the ends of the two curtains, or faces, between which the baſtion is ſituated. Where the mean and great ſyſtems of fortification are blended, the baſtions connecting the faces, which appertain to thoſe ſyſtems reſpectively, will be unequal in regard to the general proportions of their two ſides, and the gorge will be divided into two unequal parts by its capital; which paſſes in a right line from the flanked angle to the centre of the polygon; and where the polygon is drawn upon an ellipſis, or oval, and the defences are derived from two or more centres, the capital of each demi-baſtion will lead to a diſtinct point, *i. e.* the centre of its own derivation, and there will be found a ſpace between the two capitals, excluſive of two unequal demi-gorges. This, however, rarely occurs, and, when it does, is more a nominal than an eſſential difference; it being uſual to conſider a mean difference between the two, as the centre of the gorge, and to ſuppoſe the demi-gorges to meet at that point. See Fortification.

Demi-Haque. See Harquebuss.

Demi-Lune, is a defence uſually attached exteriorly to the poſterns of a raveline: they were formerly made of a creſcent form, whence their name; but the modern ſyſtem explodes all circular defences, except in the more petty claſs, ſuch as redoubts, block-houſes, cavaliers, &c. The demi-lune is now generally called the *lunette*; it is in general uſe, but is always made with a flanked angle, and not circular. See Fortification.

Demi-Quian, in *Geography*, a river, ſwamp, and lake, on the

the weftern fide of Illinois river, in the N. W. territory. The river runs a S.S.E. courfe, is navigable 120 miles, and has the fwamp of the fame name on the northern bank near its mouth; which laft is 50 yards wide, 32 miles above Sagamond, and 165 miles above the Miffifippi. The lake is of a circular form, 200 yards W. of the river, is 6 miles acrofs, and difcharges itfelf into the Illinois by a fmall paffage four feet deep, 175 miles from the Miffifippi.

DEMIR-CAPI, a town of Afiatic Turkey, in the province of Natolia; 20 miles S.E. of Balikefri.

DEMISE, in *Law*, is applied to an eftate either in fee-fimple, fee-tail, or for term of life, or years; and fo it is commonly taken in many writs. It is alfo ufed for any eftate. (2 Inft. 483.)

The king's death is, in law, termed the demife of the king, to his royal fucceffor, of his crown and dignity.

DEMISE *of the king*, or *of the crown*, *demiffio regis vel coronæ*, an expreffion ufed for the natural diffolution of the king, becaufe the law is tender of fuppofing even the poffibility of his death, and which fignifies merely a transfer of property, for the king never dies. (See KING.) Plowden obferves, (177, 234.) that when we fay the demife of the crown, we mean only that in confequence of the difunion of the king's natural body from his body politic, the kingdom is transferred or demifed to his fucceffor; and fo the royal dignity remains perpetual. The demife of the king does not difcontinue any writ or procefs. Vide ftat. 1 Ed. VI. cap. 7. fect. 1, 2, 3.

Nor does it determine any commiffion civil or military, or great office of ftate, but they fhall continue in force for fix months after the fovereign's demife, unlefs made void by the next fucceffor. Stat. 7 and 8 Will. III. cap. 27. fect. 21. 1 Ann. ftat. 1. cap. 8. 6 Ann. cap. 7. fect. 8.

Neither is a parliament thereby determined till after fix months. 7 & 8 Will. III. cap. 15.

Nor is a defendant, who hath pleaded to an information, obliged to plead to it again. But he may plead again upon requeft made to the court, within five months after the demife. 4 & 5 Will. & Mar. cap. 18. fect. 7.

DEMISE, and *Redemife*, denote a conveyance where there are mutual leafes made from one to another of the fame land, or fomething out of it.

DEMI-*Vills*. See VILL.

DEMIURGE, Δημιεργος, from δημιος, which denotes a *public fervant*, and εργον, *work*, in the *Mythology of the Eaftern Philofophers*, was one of the Æons, employed by the fupreme Deity in the creation of the world. The character they give him is a compound of fhining qualities, and infupportable arrogance; and his exceffive luft of empire effaces his talents and virtues. He is reprefented as claiming dominion over the new world he has formed, as his fovereign right; and, excluding totally the fupreme Deity from all concernment in it, he demands from mankind, for himfelf and his affociates, divine honours.

DEMM, in *Geography*, a town of Arabia, in the country of Yemen; 20 miles S.S.W. of Chamir.

DEMMIN, anciently called *Timin*, *Dymin*, *Demyn*, or *Dimmin*, a fmall town of Pruffia, in Pomerania, on the river Peene at the confluence of two lakes, the Trebel and the Tollen, with a good corn trade. It is one of the oldeft towns in Pomerania, and greatly decayed. Several fkirmifhes took place in its neighbourhood between the Swedes and French in the autumn of the year 1807. It is only 36 miles S. of Stralfund.

DEMOCEDES, in *Biography*, the fon of Calliphon of Croton, a city in Italy, acquired great fame for his fkill in medicine and furgery, and fettling at Ægina, whither he went to efcape the tyranny of his father, he received from the city a falary of a talent annually. At Athens, to which place he was invited, he was engaged on a ftipend of 100 minæ, and from Polycrates, the tyrant of Samos, to whom he was afterwards attached, he received annually two talents. From this ftate of affluence and confideration, he fell into the deepeft diftrefs. Polycrates being treacheroufly murdered by Orætes, and Orætes in his turn, killed by order of Darius Hyftafpis the king of Perfia, Democedes, with the reft of the houfehold of the tyrant, were conveyed to Sufa, loaded with chains, and thrown into a dungeon. But Darius having diflocated his ankle, and obtaining no relief from his furgeon, commanded Democedes to be releafed, and to be brought before him. Under his care, the king was foon relieved from his pain, and the other confequences of the accident. This brought him into great favour, which was further increafed by his curing an ulcer in the breaft, with which Atoffa, the daughter of Cyrus, was afflicted. He was now lodged in a magnificent houfe, admitted to the table, and to the moft intimate familiarity with the king, and loaded with prefents. In this ftate he is faid to have employed his intereft in procuring the pardon of his brethren, who had failed in relieving the king, who were to have been impaled. That he fhould wifh to efcape from a country where favour was accorded, rather to his fuccefs than to his fkill, where he had fuffered fo much, and where he was ftill a prifoner, will excite no furprife; accordingly his thoughts were turned in devifing means by which he might get to his own country, which at length he effected. For pretending to enter into the views and interefts of the Perfians, he procured himfelf to be fent with fome of the nobles, to explore the coaft of Greece, and difcover in what parts it might be attacked with the greateft probability of fuccefs. Stopping at Tarentum, the Perfians were feized as fpies, but Democedes efcaped to Croton, whither the Perfians, on being liberated, followed him, and demanded that he fhould be given up to them, and on the Crotonians refufing, they threatened them with the vengeance of the king. Democedes is faid to have married a daughter of the famed Milo, who was alfo a native of Croton, and to have continued there the remainder of his days. General Biography.

DEMOCRACY, formed of the Greek δημος, *people*, and κρατειν, *to command*, *govern*, a form of government, or conftitution of a ftate, by virtue of which the fovereignty, or fupreme authority, is lodged in the people, who exercife the fame by perfons of their own order, deputed for that purpofe. In a democracy, therefore, the people are in fome refpects the fovereign, and in others the fubject. In this kind of government, the people in whom the fupreme power refides, ought to do of themfelves whatever they conveniently can; and what they cannot well do, they muft commit to the management of minifters; but it is a fundamental maxim in a democracy, that the people fhould chufe their minifters, that is, their magiftrates, whether the election be made by themfelves, as at Athens, or by fome magiftrate deputed for that purpofe, as was cuftomary at Rome upon certain occafions. The people, fays Montefquieu (Sp. of Laws, vol. i. p. 13.) are extremely well qualified for chufing thofe, whom they are to intruft with part of their authority. They can tell when a perfon has been often in battle, and has had particular fuccefs; they are therefore very capable of electing a general. They can tell when a judge is affiduous in his office, when he gives general fatisfaction, and has never been charged with bribery; this is fufficient for chufing a prætor. They are ftruck with the magnificence or riches of a fellow-citizen: this is as much as is requifite for electing an ædile. But are the

the people able to manage an affair, to find out and to make a proper ufe of places, occafions, moments? No; this is beyond their capacity. Should we doubt of the people's natural ability in refpect to the difcernment of merit, we need only caft our eyes on the continual feries of furprifing elections made by the Athenians and Romans; which no one will furely attribute to hazard. As moft citizens, though they have a capacity of chufing, are not, however, fufficiently qualified to be chofen; fo the common people, though capable of calling others to an account for their adminiftration, are incapable of the adminiftration themfelves. The public bufinefs muft, however, be carried on, with a certain motion neither too quick nor too flow. But the action of the common people is always either too remifs or too violent. In a popular ftate the inhabitants are divided into certain claffes. In the manner of making this divifion great legiflators have fignalized themfelves; and on this the duration and profperity of democracy have always depended. As the divifion of thofe who have a right of fuffrage is a fundamental law in a republic; fo the manner of giving this fuffrage is another fundamental law. The fuffrage by lot is natural to democracy; as that by choice is to ariftocracy. The former is a method of electing that offends no one; it allows each citizen to entertain reafonable hopes of ferving his country; but as this method is naturally defective, it has been the glorious endeavour of the moft eminent legiflators to regulate and amend it. The law which determines the manner of giving the fuffrages is likewife fundamental in a democracy. The people's fuffrages ought, without doubt, fays Montefquieu, to be public; and this fhould be confidered as a fundamental law of democracy. The lower fort of people ought to be directed by thofe of higher rank, and reftrained within bounds by the gravity of certain perfonages. Hence by rendering the fuffrages fecret in the Roman republic all was loft; it was no longer poffible to direct a populace that fought its own deftruction. It is likewife a fundamental law in democracies, that the people fhould have the fole power to enact laws; and yet there are a thoufand occafions in which it is neceffary the fenate fhould have a power of decreeing; and it is often proper to make fome trial of a law before it is eftablifhed. In this refpect the conftitutions of Rome and Athens were extremely wife. The decrees of the fenate had the force of laws for the fpace of a year, and did not become perpetual till they were ratified by the confent of the people.

The principle of democracy is virtue. When Sylla wanted to reftore Rome to its liberty, this unhappy city was incapable of receiving it. She had only fome feeble remains of virtue, and as this was every day diminifhing, inftead of being roufed out of her lethargy, by Cæfar, Tiberius, Caius, Claudius, Nero, Domitian, fhe every day rivetted her chains; the blows fhe ftruck were levelled againft the tyrants, but not at the tyranny. The politic Greeks, who lived under a popular government, knew no other fupport but virtue. The modern inhabitants of that country are entirely taken up with manufactures, commerce, finances, riches, and luxury. The principle of democracy is corrupted, not only when the fpirit of equality is extinct, but likewife when they indulge a fpirit of extreme equality, and when every citizen wants to be upon a level with thofe he has chofen to command him. Thus the people, incapable of bearing the very power they have intrufted, want to do every thing of themfelves, to debate for the fenate, to execute for the magiftrate, and to ftrip the judges. When this is the cafe, virtue can no longer fubfift in the republic. Democracy has, therefore, two exceffes to avoid; the fpirit of inequality, which leads to ariftocracy or monarchy; and the fpirit of extreme equality, which leads to defpotic power, as the latter is compleated by conqueft. As diftant as heaven is from earth, fo is the true fpirit of equality from that of extreme equality. The former does not confift in managing; fo that every body fhould command, or that no one fhould be commanded; but in obeying and commanding our equals. It endeavours not to be without a mafter, but that its mafters fhould be none but its equals. In the ftate of nature, indeed, all men are born equal; but they cannot continue in this equality. Society makes them lofe it, and they recover it only by means of the laws. Such is the difference between a well and an ill policed democracy, that in the former men are equal only as citizens, but in the latter they are equal alfo as magiftrates, fenators, judges, fathers, hufbands, mafters. The natural place of virtue is near to liberty; but it is not nearer to extreme liberty than to fervitude.

The moft flourifhing democracies in eminent times were thofe of Rome and Athens, and in latter days, the republic of Geneva in Switzerland: the modern republics, as Venice, and the United Provinces, were rather ariftocracies than democracies.

In a democracy, where the right of making laws refides in the people at large, public virtue, or goodnefs of intention, is more likely to be found than either of the other qualities of government; and therefore it ufually poffeffes a confiderable degree of patriotifm and public fpirit. Democracies are ufually the beft calculated to direct the end of a law; ariftocracies to invent the means by which that end fhall be obtained; and monarchies to carry thofe means into execution. See REPUBLIC.

DEMOCRAT, in *Geography*, a town of Egypt; 20 miles N. of Afna.

DEMOCRITUS, in *Biography*, a celebrated philofopher of the Eleatic fect, was born at Abdera, a town of Thrace, in the firft year of the 80th Olympiad, B. C. 460, and was contemporary with Socrates, Anaxagoras, Archelaus, Parmenides, Zeno, and Protagoras. His father was a perfon of rank and opulence, and is faid to have contributed liberally towards the entertainment of the army of Xerxes, on his return to Afia, in recompence of which fervice the Perfian king made the Abderites rich prefents, and left among them feveral Chaldæan magi. By thefe magi Democritus was inftructed in aftronomy and theology. Upon his father's death, he received the portion of 100 talents bequeathed him, and thus amply provided with money, he travelled into diftant countries in purfuit of knowledge; firft vifiting Egypt for the purpofe of learning geometry of the Egyptian priefts; then directing his courfe to Ethiopia, in order to converfe with the gymnofophifts of that country; and from thence he paffed over into Afia, where he refided for fome time among the Perfian magi, and, as fome have faid, his curiofity led him into India. He was alfo inftructed in the doctrines of the Pythagorean fchool, and became a difciple of Leucippus. His refources were completely exhaufted in his travels, and returning deftitute to his native place, he was amply fupplied by his brother Damafis. As it was a law at Abdera, that any perfon, who wafted his patrimony, fhould be deprived of the rites of fepulture, Democritus, dreading this difgrace, enriched himfelf by delivering lectures to the people, out of one of the moft valuable of his writings, entitled "Deacofmus," fo that he had no apprehenfion of fuffering cenfure as a fpendthrift. Befides money, he acquired great fame, and excited much admiration among the ignorant Abderites. Of his knowledge of natural philofophy, he artfully availed himfelf for predicting unexpected changes in the weather, fo that his fellow-citizens conceived that he

poffeffed the faculty of predicting future events; and thus deluded they diftinguifhed him by the appellation of "Wifdom," regarded him as a being more than mortal, and entrufted him with the direction of their public affairs. Preferring, however, a contemplative and ftudious to a political and active life, he declined the public honours affigned him, and fpent the refidue of his days in folitude. Many marvellous tales are related concerning him during his retreat from the world; but as they are fabulous, it is needlefs to recite them. We may, neverthelefs, deduce this inference from them, that Democritus was a man of fublime genius and penetrating judgment; who, by much obfervation and ftudy, and long experience, became an eminent mafter of fpeculative and phyfical fcience; and, like Roger Bacon at a later period, he aftonifhed and impofed upon his ignorant and credulous countrymen.

Democritus has been commonly known under the appellation of the "Laughing Philofopher;" and Seneca relates, that whenever he appeared in public, he expreffed his contempt of the follies of mankind by laughter. But this is one of thofe numerous tales, the truth of which is contradicted by his love of folitude and contemplation, and by his known character for that ftrength and elevation of mind, which his philofophical refearches required. It is not improbable, however, that a man, fo fuperior to his ftupid countrymen, might frequently treat their follies with ridicule and contempt. Hence, among his fellow-citizens, he obtained the appellation of γελασινος, or the "Derider." In his manners Democritus was chafte and temperate, and his fobriety was recompenfed by continued health and vigour in very advanced age. He is faid to have lived to the year B. C. 361, and to have died in his 99th year by mere decay. His death was much lamented by his countrymen, and the charge of his funeral was defrayed out of the public treafury. He wrote much, but none of his works are extant. Diogenes Laertius has given a long catalogue of his works on natural and moral philofophy, criticifm, and polite literature.

Concerning truth, Democritus taught, that there are two kinds of knowledge, one obfcure, derived from the fenfes, and another genuine, obtained by the exercife of thought upon the nature of things. This latter mode of acquiring certain knowledge he confeffed to be very difficult; and, therefore, he ufed to fay, that truth lay in a deep well, from which it is the office of reafon to draw it up. Concerning phyfics, it was the doctrine of this philofopher, that nothing can ever be produced from that which has no exiftence, and that any thing which exifts can never be annihilated. Whatever exifts muft confequently owe its being to neceffary and felf-exiftent principles, of which he conceived there were two; *viz.* atoms, and a vacuum, both infinite, the former in number, the latter in magnitude. Atoms are folid, and the only beings; vacuum, or entire fpace, can neither be faid to be exiftent nor non-exiftent, being neither corporeal nor incorporeal. Atoms have the property of figure, magnitude, motion, and weight, being heavy in proportion to their bulk. They are various in figure and in magnitude; and are perfectly folid, indivifible, and unalterable. Thefe atoms have been eternally moving in infinite vacuum or fpace, in a direction perpetually deviating from a right line; and thus collifions are produced, which occafion innumerable combinations of particles, from which arifes the various form of things that exift. Thefe primary corpufcles are moved and united by that natural neceffity, which is the only fate that creates and governs the world. The fyftem of nature is one, confifting of parts, differing in their figure, order, and fituation. The production of an organized body is occafioned by the fuitable arrangement of atoms adapted in their nature to form that body; if it be diverfified, alteration takes place; if it be entirely deftroyed, diffolution. The qualities of bodies are not effential to their nature, but the cafual effect of arrangement; and this occafions the different impreffions which they make upon the fenfes. In infinite fpace there are innumerable worlds, fome fimilar, others diffimilar; but all fubject to growth, decay, and deftruction. The world has no animating principle, but all things are moved by the rapid agitation of atoms. The fun and moon are compofed of light particles, revolving about a common centre. The heavenly bodies are arranged in the following order; firft, the fixed ftars, then the planets, then the fun, then the moon: all move from eaft to weft, and thofe which are neareft revolve with the leaft velocity; fo that the fun, the inferior planets, and the moon, move more flowly than the reft.

A comet is a combination of planets, which approaching near each other, appear as one body. The earth at firft was fo fmall and light, as to wander about in the regions of fpace; but at length increafing in denfity, it became immoveable. The fea is continually decreafing, and will at length be dried up. Man was at firft produced from water and earth. Our knowledge of his exiftence arifes from confcioufnefs. The foul, or principle of animal life and motion, is the refult of a combination of round or fiery particles, confifting of two parts, one feated in the breaft, which is the rational, the other diffufed through the whole body, which is the irrational. The foul perifhes with the body; but human bodies, though they perifh, will revive. Different animal beings poffefs different fenfes. Perception is produced by εἴδωλα, images, which flow from bodies according to their refpective figures, and ftrike upon the organ of fenfe.

The fundamental difference between the doctrine of Democritus, and that of former philofophers, concerning atoms, is, that the latter conceived fmall particles endued with various qualities; whereas this philofopher conceived the qualities of bodies to be, as we have already faid, the mere effect of arrangement. Democritus, in his whole fyftem, pays no regard to an external efficient caufe, but abfurdly fuppofes, that the intrinfic neceffity, which gives motion to atoms, is *alone* fufficient to account for the phenomena of nature. Whatever he is faid to have taught concerning nature, fate, or providence, he merely afferted, that the fire, which refulted from the combination of certain fubtle atoms, and which has been called the foul of the world, is a mechanical agent in nature, caufing by its rapid motion the changes which take place in the univerfe. Plutarch fays, that Democritus confidered the fun and moon as ignited plates of ftone; but this is not confiftent with his general fyftem, and with his knowledge of nature. The belief of the materiality of the foul was the natural refult of the atomic fyftem; for if the foul be a mere compofition of atoms, when thefe are difperfed, it muft perifh. As to the revivifcence of human bodies, he can only be fuppofed to mean, that the atoms compofing any human foul, would, after their difperfion, coalefce again, in fome diftant period, and recover their former life. The term ειδωλον, or image, feems to have had, in his ufe of it, two different fignifications: it denoted thofe images which he fuppofed to flow from external objects, and ftriking upon the fenfes, excite ideas in the mind, and alfo, thofe divine beings that exifted in the air, and which he called gods. Although Democritus rejected the notion of Deity, and allowed him no fhare in the creation or government of the world, he endeavoured to conceal his impiety, by admitting the popular belief of divinities inhabiting the aerial

aerial regions, and teaching that they make themfelves vifible to fome favoured mortals, and enable them to predict future events.

The moral doctrine of Democritus, like that of Epicurus, makes the enjoyment of a tranquil ftate of mind, 'ευθυμια, the great end of life, and confequently teaches moderation as the firft law of wifdom. Moreover, he maintained that there is nothing naturally becoming or bafe in human actions, but that every diftinction of this nature arifes from cuftom or civil inftitutions, and that laws are framed to reftrain the natural propenfity of mankind to injure one another; in this latter refpect his opinion feems to have coincided with the more modern doctrine of Hobbes.

We cannot forbear, before clofing this article, to fubjoin fome valuable maxims of practical judgment and conduct, afcribed to Democritus.

"He who fubdues his paffions is more heroic than he who vanquifhes an enemy; yet there are men who, whilft they command nations, are flaves to pleafure. It is criminal, not only to do mifchief, but to wifh it. He who enjoys what he has, without regretting the want of what he has not, is a happy man. The fweeteft things become the moft bitter by excefs. Do nothing fhameful though you are alone; revere yourfelf more than all other men. A man muft either be good or feem to be fo. Every country is open to a wife man, for he is a citizen of the world. It is better for fools to be governed than to govern. Rulers are chofen, not to do ill, but good. By defiring little, a poor man makes himfelf rich. A cheerful man is happy, though he poffeffes little; a fretful man is unhappy in the midft of affluence. One great difference between a wife man and a fool is, that the former only wifhes for what he may poffibly obtain, the latter defires impoffibilities. It is the office of prudence, where it is poffible, to prevent injuries; but where this cannot be done, a wife regard to our own tranquillity will preferve us from revenging them." Diog. Laert. l. i. ix. Stob. Serm. Suidas. Sext. Emp. Plutarch. Bayle. Moreri. Brucker's Hift. Phil. by Enfield, vol. i. See Atomical *Philofophy*.

Democritus, a Greek writer on mufic, of which nothing remains but the name.

DEMODOCUS, an ancient Greek bard; whofe character Homer, as a poet, in the 7th book of the Odyffey, exalts to the fummit of human excellence.

DEMOGORGON, in *Mythology*, the chief of the terreftrial divinities, as its name, derived from Δαιμων and γοργων, imports. Boccace, in his genealogy of the gods (l. 1.) reprefents him as a flovenly old man, overfpread with filth, pale, and disfigured, who had his dwelling in the heart of the earth. His companions were Eternity and Chaos: growing weary, it is faid, of this difmal folitude, he made a little bowl to fit upon, and having raifed himfelf into the air, encompaffed the earth, and fo formed the heavens. Having accidentally paffed over the Acroceraunian mountains, he fetched from thence the burning matter, which he fent to heaven to enlighten the world, and thus formed the fun, which he gave in marriage to the earth; from which marriage proceeded Tartarus, the Night, &c. Demogorgon is reported to have feveral children, of whom the firft was "jarring Difcord," fevered from the bowels of Chaos, and raifed from the bottom of the earth to dwell upon the furface; Pan, his fecond fon, and the three Parcæ, *viz.* Clotho, Lachefis, and Atropos, Heaven, Pitho, and the Earth, who was his eighth child. The Earth had afterwards feveral children, whofe father was not known, fuch as Night, Tartarus, Pharca, Tages, and Antæus. The ninth of Demogorgon's children was Erebus, who had a numerous offspring. Thefe fables are fuppofed to allude in a myfterious manner to the creation of the world, the knowledge of which had been acquired from fome imperfect tradition. The Arcadians, as Bauier fuggefts, (Mythology, &c. vol. ii. p. 550.), feeing that the earth of itfelf produced flowers and fruits, fountains, ftreams, and rivers, that it frequently emitted fire and flames, and that it was liable to convulfions, imagined that fhe was animated, and gave the name of Demogorgon to the divinity that prefided over her. The philofophers, it is probable, meant no more by this divinity than that vegetative principle which gives life to the plants, defcribed by Virgil, (Georg. l. ii.)

> "Spiritus intus alit, totamque infufa per artus
> Mens agitat molem."

The vulgar fancied there was a real god, who refided in the bowels of the earth, to whom they offered facrifices, efpecially in Arcadia. Some authors, however, have imagined, that Demogorgon had been a magician, fo fkilful in his art, that he had ghofts and aerial fpirits under his command, whom he abfolutely fubjected to his will, feverely punifhing fuch as did not execute his orders.

DEMOISELLE, the *dancing-bird*, in *Ornithology*, a long-legged and long-necked bird of the *Ardea* kind, a native of Numidia. It is remarkable for its jumping or dancing in its walk. It has the fame kind of plication in the windpipe with the common crane. It is the Ardea *Virgo* of Gmelin, the Numidian crane of Albinus, the demoifelle of Numidia of Edwards, and the demoifelle of Latham. It inhabits the eaftern and weftern fhores of Africa, Egypt, Numidia, Tripoli, about the Cafpian and Black feas, and the lake Baikal.

Its bill is yellowifh, greenifh at the bafe, and red at the vertex; the irides are red, the crown cinereous, the reft black, as are alfo the neck, throat, breaft, legs, and wings; the long feathers of the breaft are pendulous, the creft white and hanging backwards; the back, vent, tail, abdomen, blueifh-cinereous.

DEMON. See Dæmon.

DEMONA, *Valley of*, in *Geography*, a diftrict of the ifland of Sicily, lying to the north-eaft part of the ifland, neareft to Italy, about 100 miles long, and 20 broad.

DEMONAX, in *Biography*, a Cynic philofopher, who flourifhed during the reign of Adrian. He was a native of Cyprus, and defcended from a family of wealth and high rank; but preferring a life of philofophic ftudy to the employments which his birth and fortune might have commanded, he removed to Athens while he was young, and there fpent the remainder of his days. In his manners and habits he was, in fome refpects, the imitator of Diogenes, and hence he obtained a rank among the Cynics, though he never profeffed himfelf to be of any fect. From them all he felected what was excellent, and moft favourable to moral wifdom; and like Socrates he endeavoured to make philofophy not a fpeculative fcience, but the rule of life and manners. He was virtuous without oftentation, and was able to reprove vice without acrimony, and with the happieft effect. So high was his reputation, that the greateft deference was paid to his opinion in the affemblies of the Athenian people. After his death, which was not till he had attained the age of 100, he was honoured with a public funeral, attended with a numerous train of philofophers, and others who lamented the lofs of fo eftimable a character. Moreri. Brucker's Hift. Phil. by Enfield.

DEMONIAC. See Dæmoniac.

DEMONIACAL Possession. See Dæmoniacal *Poffeffion*.

DEMOIVRE, Abraham, in *Biography*, a celebrated mathematician,

mathematician, born at Vitri, in France, in the year 1667. At the revocation of the edict of Nantz, in 1685, he determined, with many others, to take shelter in England, where he pursued the mathematics with great eagerness, having laid the foundation of this knowledge in his own country. His very limited income induced him to give lessons to private pupils, and also to read public lectures on the branches of science in which he was most conversant. Sir Isaac Newton's "Principia" falling in his way, led him to pay particular attention to geometrical investigations, and he shortly after became a first rate mathematician. He was soon associated with the principal philosophers of his own times, and was elected member of the Royal Society of London, and also of the academies of Berlin and Paris. By the former he was fixed on as a fit person to decide the famous contest between Newton and Leibnitz concerning the invention of fluxions. Towards the close of his life he was consulted on all questions relating to chances, gaming, and annuities, and by his answers he chiefly subsisted. He died at London November 1754, at the great age of 87 years. Besides many important and interesting papers in ten or twelve volumes of the Philosophical Transactions of London, he published, 1. "Miscellanea Analytica de Seriebus et Quadraturis," &c. 2. A 4to volume on the "Doctrine of Chances;" and another volume in 8vo. "On Annuities." This was first printed in the year 1724. A few years afterwards, Mr. Thomas Simpson published a work on the same subject, in which he paid some handsome compliments to Demoivre, who so far from feeling the obligation, passed several severe and unmerited censures on Mr. Simpson in a second edition of his own work. Mr. Simpson replied, and here the controversy terminated, but by no means to the credit of M. Demoivre, who was considered by the philosophers of that day as having acted in an uncandid and ungracious manner towards a young man of high merit and extraordinary talents.

DEMONIUS Lapis, in *Natural History*, a name given to a stone famous among the writers of the middle ages for a number of imaginary virtues, such as rendering people victorious over their enemies, and the like. All the description they have left us of it is, that it was variegated with two colours laid in lines so as to represent a rainbow. It was probably an agate.

DEMONSTRABLE, a term used in the schools, to signify somewhat that may be clearly and evidently proved: thus, it is demonstrable that the side of a square is incommensurable with the diagonal.

DEMONSTRATION, in *Logic*, a syllogism in form, containing a clear and irrefragable proof of the truth of a proposition.

A demonstration is a convincing argument, the two first propositions whereof are certain, clear, and evident; whence of necessity arises an infallible conclusion.

A demonstration usually consists of three parts; explication, preparation, and conclusion.

The explication is the laying down of the things supposed to be given or granted; from which the demonstration is to be made. The preparation is something to be previously done, according to the nature of the demonstration intended. The conclusion is a proposition that concludes the thing to be demonstrated, fully persuading, and convincing the mind.

The method of demonstrating things in mathematics is the same with that of drawing conclusions from principles in logic. In effect, the demonstrations of mathematicians are no other than series of enthymemes: every thing is concluded by force of syllogism, only omitting the premises, which either occur of their own accord, or are recollected by means of quotations. To have the demonstration perfect, the premises of the syllogisms should be proved by new syllogisms, till at length you arrive at a syllogism, wherein the premises are either definitions, or identic propositions.

Indeed it might be demonstrated, that there cannot be a genuine demonstration, *i. e.* such a one as shall give full conviction, unless the thoughts be directed therein according to the rules of syllogism. Clavius, it is well known, resolved the demonstration of the first proposition of Euclid into syllogism: Herlinus, and Dasipodius, demonstrated the whole six first books of Euclid, and Henischus, all arithmetic, in the syllogistic form.

Yet people, and even mathematicians, usually imagine, that mathematical demonstrations are conducted in a manner far remote from the laws of syllogism; so far are they from allowing that those derive all their force and conviction from these. But we have men of the first rank on our side the question. M. Leibnitz, for instance, declares that demonstration to be firm and valid, which is in the form prescribed by logic; and Dr. Wallis confesses, that what is proposed to be proved in mathematics, is deduced by means of one, or more syllogisms: the great Huygens, too, obobserves, that paralogisms frequently happen in mathematics, through want of observing the syllogistic form. See Syllogism.

Problems consist of three parts: a proposition, resolution, and demonstration.

In the proposition is indicated the thing to be done.

In the resolution, the several steps are orderly rehearsed, whereby the thing proposed is performed.

Lastly, in the demonstration it is shewn, that the things enjoined by the resolution being done, that which was required in the proposition is effected. As often, therefore, as a problem is to be demonstrated, it is converted into a theorem; the resolution being the hypothesis, and the proposition the thesis: for the general tenor of all problems to be demonstrated is this; that the thing prescribed in the resolution being performed, the thing required is done.

The schoolmen make two kinds of demonstration; the one τὸ διότι, or *propter quod;* wherein an effect is proved by the next cause. As when it is proved, that the moon is eclipsed, because the earth is then between the sun and moon. The second τὸ ὅτι, or *quia;* wherein the cause is proved from a remote effect: as when it is proved, that fire is hot, because it burns; or that plants do not breathe, because they are not animals; or that there is a God, from the works of creation. The former is called demonstration à priori, and the latter demonstration à posteriori.

Demonstration, *Affirmative*, is that which, proceeding by affirmative and evident propositions, dependent on each other, ends in the thing to be demonstrated.

Demonstration, *Apagogical*. See Apagogical.

Demonstration, *Geometrical*, is that framed of reasonings drawn from the elements of geometry.

Demonstration, *Mechanical*, is that, the reasonings whereof are drawn from the rules of mechanics.

Demonstration *à priori*, is that whereby an effect is proved from a cause, either a next, or remote one; or a conclusion proved by something previous, whether it be a cause, or only an antecedent.

Demonstration *à posteriori*, is that whereby either a cause is proved from an effect, or a conclusion is proved by something posterior; whether it be an effect, or only a consequent.

DEMONSTRATIVE, in *Rhetoric*, one of the genera, or

or kinds, of eloquence; being that which obtains in the compofing of panegyrics, invectives, gratulatory and funeral orations.

Rhetoric is divided into three kinds; deliberative, demonftrative, and judiciary. See RHETORIC.

Demonftrative difcourfes, confift either in praife or difpraife; and thefe refpect either perfons or things. In praifing or difpraifing perfons, rhetoricians prefcribe two methods. One is, to follow the order, in which every thing happened, that is mentioned in the difcourfe; and the other is, to reduce what is faid under certain general heads, without a ftrict regard to the order of time. In the profecution of the firft method, the difcourfe may be conveniently divided into three periods; the firft containing occurrences that preceded the perfon's birth; the fecond the whole courfe of his life; and the third events fubfequent to his death. Under the firft of thefe may be comprehended what is proper to be faid concerning his country or family; under the fecond the qualities of his mind and body, together with his circumftances in the world; and under the third, the public lofs, and public honours conferred upon the deceafed. This order of time has been followed by Ifocrates, in his funeral oration upon Evagoras, king of Salamis, and by Pliny, in his panegyric upon the emperor Trajan. This kind of difcourfe, in which the method is plain and obvious, will require the more agreeable arts to render it interefting and delightful; but otherwife it feems rather like an hiftory than an oration. The other method above fuggefted was to reduce the difcourfe to certain general heads, without regarding the order of time. As if any one in praifing the elder Cato, fhould propofe to do it by fhewing, that he was a moft prudent fenator, an excellent orator, and moft valiant general; all which commendations are given him by Pliny. (Hift. Nat. l. vii. c. 27.) In like manner the character of a good general may be comprifed under four heads; fkill in military affairs, courage, authority, and fuccefs; from all which Cicero recommends Pompey; (Pro Leg. Manil. c. 24.) and agreeably to this method Suetonius has written the lives of the firft twelve Cæfars.

Things, as diftinguifhed from *perfons*, comprehend all beings inferior to man; and likewife the habits and difpofitions of men, either good or bad, when confidered feparately and apart from their fubjects, as arts and fciences, virtues and vices; with whatever elfe may be a proper fubject for praife or difpraife. In difcourfes of this kind, whether of praife or difpraife, the orator fhould well confider where, and to whom he fpeaks, and adapt his difcourfe to his audience. Ward's Oratory, vol. i. lect. 7.

DEMONSTRATIVE, in *Grammar*, is applied to pronouns which ferve to fhew, point out, or indicate a thing: as, *this*, *that*, *thofe*, &c.

They are alfo called definitive, becaufe they define and limit the extent of the common name, or general term, to which they either refer, or are joined.

DEMONSTRATIVE *Evidence*. See DEDUCTIVE, and EVIDENCE.

DEMONT, or DEMONTE, in *Geography*, a town of France, in the department of the Sture, which formerly was a part of Piedmont in Italy, with a caftle on the river Sture, and a population of 6000 individuals; 12 miles S.W. of Coni. N. lat. 44° 19′. It is the chief place of a canton in the diftrict of Coni. The canton has 5 communes, and 9249 inhabitants.

DEMOSTHENES, in *Biography*, the moft celebrated orator of ancient Greece, was the fon of a refpectable citizen of Athens, who was the proprietor of large iron-forges, and kept a number of flaves manufacturing fword-blades, and furniture of different kinds, by which he acquired confiderable wealth: though Juvenal (l iv. fat. 10.) has unjuftly degraded his origin. He was born in the fourth year of the 99th olympiad, B C. 381: and at the age of feven years he loft his father, who left him a patrimony of 14 talents, (about 3150*l.* fterling.) Being of a feeble conftitution and delicate health, his fond mother would not allow him to be enured to any laborious exercife, and by the unfaithfulnefs of his guardians, he was deprived of the means of procuring thofe advantages in literary tuition to which his fortune entitled him. In his 17th year he determined to devote himfelf to the bar, his ambition being excited, as fome fay, by hearing the public pleadings in an important caufe; others fay, that at this age he pleaded his own caufe, againft his fraudulent guardians with fuccefs. However this be, he affiduoufly applied to ftudy the art of declamation; and with this view he frequented the fchool of Ifæus, either becaufe the terms of Ifocrates were too high for his finances, or perhaps, becaufe he preferred the energy and vehemence of the former to the more mild and gentle eloquence of the latter, whofe fchool was at this time the moft famous at Athens. At the fame time he was an auditor of Plato, and diligently ftudied his works; to which circumftance he was indebted in a great degree for the magnificence of his diction. He laboured, however, under feveral natural infirmities and defects, which were likely to impede his progrefs in his profeffion, and which he was therefore determined to overcome. His voice was weak and ftammering, his pronunciation indiftinct, and his gefture ungraceful. In order to furmount thefe difadvantages, he fhut himfelf up in a cave, that he might ftudy with lefs diftraction, and there declaimed, fo that he could not be heard or difturbed, and he remained in this fubterraneous apartment for two or three months at a time. He likewife exercifed his voice on the fea-fhore, that he might accuftom himfelf to a tumultuous affembly, and in walking up hill, with pebbles in his mouth, that he might correct a defect in his utterance; he practifed at home before a mirror, and with a naked fword over his fhoulders, and alfo took leffons of an eminent actor, that he might check and reform an ungraceful motion, to which he was fubject; and by thefe various means, fteadily purfued, he not only overcame his defects, but acquired diftinguifhed excellence both in elocution and action. He alfo fuperadded the ftudy of language and the art of compofition, without which no outward gracefulnefs of utterance and gefture could have enfured to him that fame, which has been tranfmitted, with his admirable orations, to after-ages. He does not appear to have excelled in extemporaneous fpeaking, and therefore his orations were faid to fmell of the lamp; neverthelefs on fome important occafions he diftinguifhed himfelf without premeditation, or at leaft previous compofition. Defpifing the affected and florid manner of the rhetoricians of his age, he made Pericles his model, and imitated his manly and forcible eloquence, fo that ftrength and vehemence are the principal characteriftics of his ftyle. In his addreffes to the people he affumes the tone of a man of virtue and patriotifm, and whilft he cenfures them for their follies and vices, he inculcates independence in principle, and vigour in action. In his Olynthiacs and Philippics, which are his capital orations, he had a fine field for the difplay of his talents; the object he had in view was to roufe the indignation of his countrymen againft Philip of Macedon, the avowed enemy of the liberties of Greece; and to guard them againft the infidious meafures by which that crafty prince endeavoured to lull them into fecurity. In the profecution of this, he adopts every proper method for animating a people renowned for juftice, humanity, and valour; but in many inftances become corrupt

rupt and degenerate. He boldly taxes them with their venality, indolence, and indifference to the public caufe; whilft with confummate art, he calls to their remembrance the glory of their anceftors, and leads them to confider that they were ftill a flourifhing and powerful people, the natural protectors of the liberty of Greece, and that they only wanted the inclination to exert themfelves, in order to make Philip tremble. With his contemporary orators, who were in the intereft of Philip, or who perfuaded the people to peace, he keeps no meafures, but reproaches them as the betrayers of their country. Phocion was of this number; he on all occafions oppofed the violence of the people; and when Demofthenes once told him that the Athenians would fome day murder him in a mad fit, he anfwered, "And you too, perhaps, in a fober fit." Such is the ftrain of the orations abovementioned, which are ftrongly animated, and abounding with the impetuofity and fire of public fpirit. The figures which he ufes are never fought after, but rife from the fubject, and are employed fparingly, for fplendour and ornament do not diftinguifh the compofitions of Demofthenes. His character, as an orator, is formed by energy of thought, which is peculiar to himfelf, and elevates him above all others. Things, and not words, appear to be the objects of his attention. He has no parade and oftentation; no methods of infinuation; no laboured introductions; but like a man, fully poffeffed by his fubject, after preparing his audience by a fentence or two for hearing plain truths, he enters directly on bufinefs; warming the mind, and impelling to action.

When Philip had affembled an army for the invafion of Attica, Demofthenes was deputed to perfuade the Bœotians to take part againft him; and fuch was the force of his eloquence that he prevailed, though Python, an orator of great fame, and the advocate of Philip, exerted his efforts againft him. At Cheronæa, however, Philip obtained a victory over the combined forces, and our orator incurred indelible reproach on the occafion, as he deferted his poft, threw down his arms, and fled with fuch precipitation, that his robe got entangled on a ftake, and terror fuggefting to him that an enemy had feized him, he exclaimed "Spare my life!" In confequence of this defeat, Demofthenes was accufed by the party that oppofed him at Athens; but he was acquitted by the people. After the death of Philip, young Alexander was defpifed; and Demofthenes thought this a favourable opportunity for crufhing the Macedonians, and fucceeded in obtaining a new league among the Grecian ftates. But the vigorous proceedings of the young king diffolved the confederacy; and Demofthenes was one of a deputation appointed to wait upon him and divert his anger; but the courage of the orator failed him, and he turned back upon the road. Alexander required him to be delivered up among other orators; but Demades pacified the king without this facrifice. Demofthenes, having difplayed his patriotifm by rebuilding the walls of Athens at his own expence, was recompenfed by a crown of gold, which was decreed to him. Æfchines, the orator, accufed him on this account; and the accufation occafioned a folemn trial, and produced Demofthenes's famous oration, "Pro Corona." He was acquitted by a great majority, and his adverfary was under a neceffity of quitting Athens for ever. On this occafion the two orators were competitors; but on a comparifon Æfchines is feeble and unimpreffive, Demofthenes is like a torrent which nothing can refift. He draws the character of his antagonift in the ftrongeft colours, and all the defcriptions in this oration are highly picturefque. There runs through it a ftrain of magnanimity and high honour. The orator fpeaks with that ftrength and confcious dignity which great actions and public fpirit alone infpire.

Soon after this conteft a circumftance occurred, which entailed difgrace on the character of Demofthenes. Harpalus, one of Alexander's officers, had been guilty of peculation, and made his efcape to Athens, as a place of fafety. Demofthenes at firft diffuaded the Athenians from giving him protection; but on a furvey of the treafures of Harpalus, the fight of one of the king's golden cups corrupted his integrity. He poifed it in his hand, and afked its weight. Harpalus replied, "To you it fhall weigh 20 talents;" and at night he fent the orator the cup with that fum. On the next day, when the cafe of Harpalus was to be confidered, Demofthenes appeared in the affembly with his throat muffled, and being called upon to fpeak, he made figns that he had loft his voice. Afterwards provoking an enquiry, as if he had been able to vindicate his innocence, he was tried, found guilty, and was fentenced to pay a fine of 50 talents, or to be imprifoned till the money was paid; but in order to avoid difgrace and confinement, he fled to Ægina. Some of his former adverfaries preffed him to accept money on his departure: and when they exhorted him to bear his fate with courage and refignation, he replied, "How can I forbear forrow on leaving a place where my enemies are more generous than any friends I can meet with elfewhere?" On the death of Alexander, when a new confederacy was planned by the Greek ftates, Demofthenes affifted the Athenian deputies in their efforts for the common caufe, and made himfelf fo popular, that a decree paffed for his recall: and upon his return, the whole body of citizens conducted him home in triumph. Although the fine could not be remitted, an equal fum was granted him under the pretext of paying his charges as conductor of the facrifices to Jupiter the preferver. But the victory of Antipater changed the fortune of Greece, and Athens, as the price of its pardon, was obliged to facrifice Demofthenes and the orators of the fame party. On the motion of Demades, a decree was paffed condemning them to death. Demofthenes took fanctuary in the temple of Neptune at Calauria. But apprehending that attempts would be made to draw him from his place of refuge, he provided himfelf with poifon; and when his expectations were realifed, by an emiffary of Antipater, he retired to the interior part of the temple, and fwallowed the dofe. Then turning to Archias, the meffenger of Antipater, who had been a player, he faid, "Now you may perform the part of Creon as foon as you pleafe, and caft out this carcafe unburied." Then turning to the altar, he exclaimed, "O Gracious Neptune! I depart alive from thy temple without profaning it, which the Macedonians would have done by my murder." Staggering as he attempted to retire, he fell by the altar, and with a groan expired. He died at the age of 59, in the year B.C. 322. The Athenians not long after erected his ftatue in brafs, and decreed that the eldeft of his family fhould be maintained at the public expence.

In his private character Demofthenes was vindictive, auftere, and implacable. For his vanity, his celebrity may be pleaded as an apology; but his love of money difgraced him both in his political and profeffional capacity. Patriotifm was undoubtedly a diftinguifhing trait of his character; and it has been alleged to his honour, that Philip regarded him as the chief obftacle to his ambitious defigns. "In that great conteft," fays one of his biographers, "he feems to have been uniformly confiftent; and though his conduct on fome occafions wanted dignity, and on others refolution, it was governed by fteady principle." As an orator he is univerfally allowed to ftand at the head of his profeffion. Cicero

cero calls him "a perfect orator," and prefers him to all other speakers, Greek or Roman. Yet Cicero could only judge of him from his writings; whilst he was a stranger to that *action*, which Demosthenes reckons the first, the second, and the third part of oratory. Quinctilian speaks of him as excelling all others in what the Greeks called δεινωσις, or that kind of diction which aggravates every circumstance proper to excite the stronger emotions. "Such," says he, "is the force, the conciseness, the tone, and vigour of his language, that you can find nothing either deficient or redundant."

"The style of Demosthenes" says Dr. Blair, (Lectures, vol. ii.) "is strong and concise, though sometimes, it must not be dissembled, harsh and abrupt. His words are very expressive; his arrangement is firm and manly; and though far from being unmusical, yet it seems difficult to find in him that studied but concealed number and rhythmus, which some of the ancient critics are fond of attributing to him. Negligent of these lesser graces, one would rather conceive him to have aimed at that sublime which lies in sentiment. His action and pronunciation are recorded to have been uncommonly vehement and ardent: which, from the manner of his composition, we are led to believe. The character which one forms of him, from reading his works, is of the austere, rather than the gentle kind. He is, on every occasion, grave, serious, passionate, taking every thing in a high tone; never lets himself down, nor attempts any thing like pleasantry. If any fault can be found with his admirable eloquence, it is that he sometimes borders on the hard and dry. He may be thought to want smoothness and grace; which Dionysius of Halicarnassus attributes to his imitating too closely the manner of Thucydides, who was his great model for style, and whose history he is said to have written eight times over with his own hand. But these defects are far more than compensated, by that admirable and masterly force of masculine eloquence, which, as it overpowered all who heard it, cannot, at this day, be read without emotion." However, to a modern many of the beauties of diction are lost; but we have such historical proof of the efficacy of his oratory, that it is impossible to doubt of its real excellence. It was Demosthenes,

"—— quem mirabantur Athenæ
Torrentem, et pleni moderantem fræna theatri:
Juvenal. Sat. x.

He was the chief of those who, in Milton's words,

"Wielded at will that fierce democrate,
Shook th' arsenal, and fulmin'd over Greece,
To Macedon, and Artaxerxes' throne. Parad. Reg.

On the subject of comparing Cicero and Demosthenes, much has been said by critical writers. The different manners of these two princes of eloquence, and the distinguishing characters of each, are so strongly marked in their writings, that the comparison is, in many respects, obvious and easy. The character of Demosthenes is vigour and austerity; that of Cicero is gentleness and insinuation. In the one, you find more manliness, in the other, more ornament. The one is more harsh, but more spirited and cogent; the other more agreeable, but withal, looser and weaker. To Demosthenes it is a disadvantage, that, besides his conciseness, which sometimes produces obscurity, the language in which he writes is less familiar to most of us, than the Latin, and we are less acquainted with the Greek antiquities than we are with the Roman. We read Cicero with more ease, and of course with greater pleasure: and it must be allowed, that Cicero is in himself a more agreeable writer than the other. "But," says Dr. Blair, "I am of opinion, that were the state in danger, or some great national interest at stake, which drew the serious attention of the public, an oration in the spirit and strain of Demosthenes, would have more weight, and produce greater effect, than one in the Ciceronian manner. Were Demosthenes's Philippics spoken in a British assembly, in a similar conjuncture of affairs, they would convince and persuade at this day. The rapid style, the vehement reasoning, the disdain, anger, boldness, freedom, which perpetually animate them, would render their success infallible over any modern assembly. I question whether the same can be said of Cicero's orations; whose eloquence, however beautiful, and however well suited to the Roman taste, yet borders oftener on declamation, and is more remote from the manner in which we now expect to hear real business and causes of importance treated." In this judgment Mr. Hume concurs, in his "Essay upon Elocution." He gives it as his opinion, that of all human productions, the orations of Demosthenes present to us the models which approach the nearest to perfection. In comparing Demosthenes and Cicero, the French critics, however, are disposed to give the preference to the latter. One exception, however, occurs. Fenelon, the famous archbishop of Cambray, gives the palm to Demosthenes.

Demosthenes is said to have composed 65 orations, of which a small proportion only is come down to our times. Among the best editions of these are that of Frankfort, 1604, folio, with Wolfius's Latin version: of Taylor, unfinished, 3 vols. 4to. Cantab.; and of Reiske, 10 vols. 8vo. Leipf. 1720. Plut. Vit. Demosth. Cicero de Oratore et Brutus. Quinctilian Inst. Univ. Hist. Gen. Biog. Rollin's Anc. Hist.

DEMOTICA, or Dimotuc, in *Geography*, a town of European Turkey, in the province of Romania, situated near the Maritsch, where a Greek archbishop resides, and where the Christians have two churches; 12 miles S. of Adrianople.

DEMOURS, Peter, in *Biography*, doctor in medicine, but more known as an oculist, was the son of Anthony Demours, an apothecary at Marseilles, under whom he received the early part of his education, which was continued at Avignon, where he resided, until he had taken the degree of doctor: this was in the year 1728. He then removed to Paris, and was placed for two years under M. Du Verney, to improve himself in anatomy. On the death of Du Verney, he was associated with M. Chirac in the care of the cabinet of natural history, in the royal garden at Paris. Having made the structure of the eye in a particular manner his study, in 1741 he sent to the royal academy of sciences a memoir on the subject, in which he shews that the vitreous humour is of a cellular texture, and that the cells communicate with each other, which had not been before observed. He now employed himself, almost exclusively, in attending to the diseases of the eye, and soon attracted so much notice as to be appointed oculist to the king. In 1767, he published "Lettre a M. Petit," on the subject of a disease in the eyes, occurring in a patient who had been inoculated with the small-pox. As he had acquired a competent knowledge of the English language, he translated into French the Edinburgh medical essays, which he published at Paris, in eleven volumes, 12mo. Baker's Natural History of the Polypus. Hales's account of a Ventilator. Ranby's treatise of Gunshot Wounds, and several volumes of essays on medicine, and on natural history, taken from the Philosophical Transactions, which procured him to be elected one of the foreign members of the royal society. He had been before associated with the royal academy of sciences at Paris. De-

mours

mours died in 1770, at an advanced age. Eloy. Dict. Hift.

DEMPSTER, Thomas, in *Biography*, a Scots writer, born about the year 1579. He was educated in the Roman catholic religion, but left his native country, and ftudied for fome time at Pembroke hall, Cambridge. From thence he went to Paris, where he pretended that he had left a great property in his own country, through attachment to his religion. It does not appear that he obtained much credit on account of thefe affertions, but was obliged to keep a fchool for his maintenance. The violence of his temper, and the mufcular powers of his body, on which he feemed to depend, led him into many difputes, the event of which obliged him to take refuge in England. He brought with him a very beautiful wife, whofe exquifite features and form attracted uncommon notice in the ftreets as fhe paffed, fo that, we are told by Bayle, it was with difficulty fhe could proceed. Dempfter next went to Pifa where he became a profeffor in the univerfity; here his wife eloped with one of his fcholars. He then removed to Bologna, where he taught with great reputation, and was admitted as member of the academy. He died in 1625. He was author of many works in law, antiquities, philology, and the feveral branches of the belles lettres. He wrote alfo "A Martyrology of Scotland." But his hiftorical facts have ever been regarded with fufpicion. In his lift of Scottifh writers he has put a number of celebrated authors, who are known not to have been born there. He has been thus characterized by M. Baillet, a prieft of his own profeffion. He forged titles of books which were never publifhed, to raife the glory of his native country, and has been guilty of feveral cheating tricks, by which he has loft his credit among men of learning. "He was," fays the learned Bayle, "a man of a prodigious memory, indefatigable, a zealous friend, and a violent enemy; he had no great judgment, nor much honefty; for he publifhed I know not how many fables without fhame. Some of his books were condemned by the Inquifition." Moreri. Bayle.

DEMULCENT Medicines, are thofe fubftances which tend to obviate the irritation of acrid and ftimulant matters in the body, not by correcting or changing their acrimony, but merely by involving it in a mild and vifcid matter, which prevents it from acting upon the fenfible parts. This clafs of medicines comprifes the vegetable mucilages or gums, and the fixed animal and vegetable oils. The latter may be ufed for the purpofe of covering the acrimonious qualities both of acids and alkalies; and even vitriolic acid may be in a great meafure covered by being mixed with the mucilage of gum arabic.

Thefe effects of demulcent medicines are fufficiently evident with refpect to the external parts; and it may be prefumed that the fame may happen with refpect to the internal, fo long as the acrid continues mixed with the demulcent. It has generally, however, been confidered by phyficians, till the time of Dr. Cullen, and even now the doctrine is followed in practice to a great extent, that demulcents act upon diftant organs of the body through the medium of the circulation. Thus the gum arabic, which is the mucilage moft univerfally employed, becaufe it can be introduced in the moft concentrated ftate, and therefore in the largeft quantity, is fuppofed to extend its demulcent qualities to the bronchiæ, and there to correct the acrimony that occafions coughing; and it is efpecially fuppofed to reach the urinary organs, and there to cover any acrimony prevailing in the urine, and thus to relieve ftrangury, ardor urinæ, &c.

But it is difficult to fuppofe that the demulcent matter retains its mild and invifcating quality, after it has been taken into the body. For, in the firft place, its vifcidity muft be greatly diminifhed in its paffage through the ftomach and inteftines to the blood-veffels, fuppofing that no other change took place, by mere dilution with the ferous fluids. But, fecondly, it is not to be queftioned that demulcents, which are commonly of a very nutritious nature, fhould pafs through the ftomach, without undergoing that digeftive procefs, by the power of the gaftric liquor, which all fuch matter undergoes; *i. e.* that it fhould, in common with other fubftances taken in, be altogether changed in its qualities, and rendered of the fame fluidity with the other matters that pafs into the lacteals; in a word, that thefe demulcents can have no effect as fuch, in the mafs of the blood, or in paffing by the various excretions.

Befides this general reafoning with refpect to mucilages, the confideration of the quantity thrown in is of no fmall weight. In common practice, hardly more than a few ounces are given in one day; and it is obvious that this can communicate a very flight mucilaginous quality to many pounds of ferofity. But not only reafoning *à priori*, experience alfo coincides in proving the correctnefs of this opinion. "What others may have obferved," fays Dr. Cullen, "I cannot determine; but, for myfelf, I can affert that, in innumerable trials, I have never obferved the effects of gum arabic in the mafs of the blood, or in the excretions derived from it. The moft frequent occafion for its ufe is in the ardor urinæ; and in that I have been often difappointed, and have often found, that two pounds of water, or watery liquors, added to the drink, would be of more fervice than four ounces of gum arabic, taken in without fuch addition." Materia Medica, vol. ii.

In fhort, there has been a deception, not uncommon in the practice of medicine, upon this fubject. When the urine is much diluted, its acrid falts are diffufed through a large medium, and irritate the paffages but little. Hence the effects of the quantity of liquid, containing mucilage in folution, have been miftaken for the effects of the mucilage, which it contained.

In the cafe of coughing, mucilages, which often decidedly allay it, and fufpend the repetition of it, produce their beneficial effects not by covering the acrimony of the circulating fluids, but, by befmearing the throat and preferving thofe parts from the irritation of their own fecretions, and of the matter raifed from the lungs.

DEMURRAGE, in *Traffic*, an allowance made to the mafter of a fhip, by the merchants for ftaying in a port longer than the time firft appointed for his departure.

DEMURRER, in *Law*, a kind of paufe, or ftop, put to the proceeding of any action, upon fome difficult point, which muft be determined by the court, before any further progrefs can be had in it.

In every action, the controverfy is either as to fact, or as to law; the firft, decided by the jury, the fecond, by the court.

A demurrer is, therefore, an iffue upon matter of law; and it confeffes the facts to be true, as ftated by the oppofite party, but denies, that by the law arifing upon thefe facts, any injury is done to the plaintiff, or that the defendant has made out a legitimate excufe; accordingly the party, which firft demurs, *(demuratur, moratur in lege)*, refts or abides upon the point in queftion. As, if the matter of the plaintiff's complaint or declaration be infufficient in law, as by not affigning any fufficient trefpafs, then the defendant demurs to the declaration; if, on the other hand, the defendant's excufe or plea be invalid, as if he pleads that he committed the trefpafs by authority from a ftranger, without making out

out the ſtranger's right; here the plaintiff may demur in law to the plea:—and ſo on in every other part of the proceedings, where either ſide perceives any material objection in point of law, upon which he may reſt his caſe.

The form of ſuch demurrer is by averring the declaration or plea, the replication or rejoinder, to be inſufficient in law to maintain the action or the defence; and therefore praying judgment for want of ſufficient matter alleged. Sometimes demurrers are merely for want of ſufficient *form* in the writ or declaration. But in caſe of exceptions to the form, or manner of pleading, the party demurring muſt, by ſtatute 27 Eliz. c. 5. and 4 & 5 Ann. c. 16. ſet forth the cauſes of his demurrer, or wherein he apprehends the deficiency to conſiſt. And upon either a *general*, or ſuch a *ſpecial* demurrer, the oppoſite party muſt aver it to be ſufficient, which is called "a joinder in demurrer;" and then the parties are at iſſue in point of law; which iſſue in law, or demurrer, the judges of the court before which the action is brought muſt determine. (Finch. L. lib. iv. c. 40. 1 Inſt. 71. Blackſt. Comm. vol. iii. p. 314.)

Accordingly, demurrers, or queſtions concerning the *ſufficiency* of the matters alleged in the pleadings, are to be determined by the judges of the court, upon ſolemn argument by counſel on both ſides; and to that end a demurrer book is made up, containing all the proceedings at length, which are afterwards entered on *record;* and copies thereof, called *paper-books*, are delivered to the judges to peruſe. When the ſubſtance of the record is completed, and copies are delivered to the judges, the matter of law upon which the demurrer is grounded, is upon ſolemn argument determined by the court, and not by any trial by jury: and judgment is thereupon accordingly given.

A *demurrer in equity* is nearly of the ſame nature as a demurrer in law; being an appeal to the judgment of the court, whether the defendant ſhall be found to anſwer the plaintiff's bill; as for want of ſufficient matter of equity therein contained; or, when the plaintiff, upon his own ſhewing, appears to have no right; or where the bill ſeeks a diſcovery of a thing which may cauſe a forfeiture of any kind, or may convict a man of any criminal miſbehaviour. For any of theſe cauſes a defendant may demur to the bill. And if, on demurrer, the defendant prevails, the plaintiff's bill ſhall be diſmiſſed: if the demurrer be over-ruled, the defendant is ordered to anſwer. Bl. Comm. v. iii. p. 466.

Demurrer *to evidence* takes place when a record, or other matter, is produced in evidence, concerning the legal conſequences of which there ariſes a doubt or queſtion in law; in which caſe the adverſe party may, if he pleaſes, demur to the whole evidence, which admits the truth of every fact that has been alleged, but denies the ſufficiency of them all in point of law to maintain or overthrow the iſſue. (Co. Litt. 72. 5 Rep. 104.) This draws the queſtion of law from the cognizance of the jury, to be decided by the court. But this kind of demurrer is now ſeldom uſed.

Demurrer *to indictments* is incident to criminal caſes, as well as civil, when the fact, as alleged, is allowed to be true, but the priſoner joins iſſue upon ſome point of law in the indictment; by which he inſiſts that the fact, as ſtated, does not amount to the crime charged.

Some have held (2 Hal. P. C. 257.) that if, on demurrer, the point of law be adjudged againſt the priſoner, he ſhall have judgment and execution, as if convicted by verdict: but this is denied by others, (2 Hawk. P. C. c. 32. § 56.) who maintain, that in ſuch caſe he ſhall be directed and received to plead the general iſſue, not guilty, after a demurrer determined againſt him. However, upon this doubt, demurrers to indictments are ſeldom uſed; ſince the ſame advantages may be taken upon a plea of not guilty; or, afterwards, in arreſt of judgment, when the verdict has eſtabliſhed the fact. Blackſt. Comm. vol. iv. p. 334.

MURIS, John de, in *Biography*, the celebrated writer on muſic, to whom the invention of muſical characters is generally given. Fabricius, biſhop Tanner, and others, allow him to have flouriſhed about the year 1330. He is ſtyled by ſome a doctor and canon of the Sorbonne, by ſome a mathematician and philoſopher, and by others a chanter of the church of Nôtre-Dame at Paris. His country is likewiſe diſputed: for though the general opinion be that he was born at Meurs in Normandy, whence he had his name, yet, by a typographical error, he is called Parmigiano in Bontempi, inſtead of Parigino, which makes him a native of Parma, inſtead of Paris. We call it a typographical error, in order to acquit Bontempi of making J. de Muris an Italian, either from ignorance or want of integrity; as we are in poſſeſſion of a proof copy of his Storia della Muſica, in which, among other corrections made in his own hand, the word Parmigiano is changed to Parigino. But though he has no title to the invention of the time-table, as we ſhall ſoon demonſtrate, he muſt certainly have been a great benefactor to practical muſic by his numerous writings on the ſubject, which, doubtleſs, threw new lights upon the art, as may be better imagined now from the gratitude of his ſucceſſors, by whom he is ſo frequently quoted and commended, than from the writings themſelves, which Time, to whom he was ſuppoſed to have been ſo great a friend, has rendered totally uſeleſs, and almoſt unintelligible.

But though he is entitled to an honourable place among muſical worthies; yet, as both his country and profeſſion have been diſputed, all that can be done to gratify the reader's curioſity concerning him, is to give a complete liſt of his works that are ſtill preſerved in the ſeveral libraries of Europe; and, from their titles and contents, to deduce at leaſt a probable opinion of other circumſtances concerning him.

Beſides a MS. by the ſame author, in the Vatican, on the ſubject of counterpoint, we found there three others by De Muris, on the ſubject of muſic. Of the two firſt, which are in the ſame volume, No. 5221, one of which is a treatiſe on "Time, or Meaſured Muſic:" Joannis de Muris Practica Cantus Menſurabilis, pr. quilibet in Arte: This tract is likewiſe in Be'net college Camb. No. 410, in the ſame vol. as Walter Odington's treatiſe, though the author has been hitherto unknown: the other is "A Compendium of Counterpoint:" Joannes de Muris Ars Summaria Contrapuncti, pr. volentibus introduci. The third, which is among the queen of Sweden's MSS. No. 1718, conſiſts of "Muſical Theorems explained in Verſe:" Joan. de Muris Theoremata Muſica Verſibus explicata.

In the king of France's library at Paris, there are two copies of his "Speculum Muſicæ," or Mirror of Muſic, in ſeven books, which is the principal and moſt ample of all his muſical writings. This is the work mentioned by Merſennus, Du-Cange, and Rouſſeau, and in which they all tried in vain, as well as myſelf, (ſays Dr. Burney) to find proofs of his having been the inventor of the time-table.

Rouſſeau has given two conſiderable quotations from this work in his Muſical Dictionary, article Discant, which de Muris defines "The ſinging extempore with one or more perſons in different concords, in ſuch a manner as to produce one harmony." Diſcantat qui ſimul cum uno vel pluribus dulciter cantat, ut ex diſtinctis ſonis ſonus unus fiat, non unitate ſimplicitatis, ſed dulcis concordiſque mixtionis unione. After which he explains what he means by concords,

cords, and the choice that fhould be made of them upon thefe occafions. He then feverely cenfures the fingers of his time for their ignorance and indifcriminate ufe of them. "If our rules are good, with what front," fays he, "do thofe dare to *difcant* or *compofe*, who are fo ignorant of concords as not to know which are more or lefs pleafing, which ought to be avoided, or moft frequently ufed; where to introduce them, or any thing that concerns the true practice of the art? If they accord, it is by mere chance; their voices wander about the tenor or plain-fong without rule, trufting wholly to Providence for their coincidence. They throw founds about at random, as awkward people throw ftones at a mark, without hitting it once in a hundred times."

The good mafter Muris then proceeds to flagellate with great fury thefe corruptors of the pure and fimple harmony of his time: "Heu! proh dolor! His temporibus aliqui fuum defectum inepto proverbio colorare moliuntur. Ifte eft, inquiunt, novus difcantandi modus, novis fcilicet uti confonantiis; offendunt ii intellectum eorum, qui tales defectus agnofcunt, offendunt fenfum: nam inducere cùm deberent delectationem, adducunt triftitiam. O incongruum proverbium! O mala coloratio, irrationabilis excufatio! O magnus abufus, magna ruditas, magna beftialitas, ut afinus fumatur pro homine, capra pro leone, ovis pro pifce, ferpens pro falmone! Sic enim concordiæ confunduntur cum difcordiis, ut nullatenùs una diftinguatur ab aliâ. O! fi antiqui periti Muficæ Doctores tales audiffent difcantatores, quid dixiffent? Quid feciffent? Sic difcantantem increparent, et dicerent: non hunc difcantum, quo uteris, de me fumis. Non tuum cantum unum et concordantem cum me facis. De quo te intromittis? Mihi non congruis, mihi adverfarius, fcandalum tu mihi es; O utinam taceres! non concordas, fed deliras et difcordas." The Latin of this paffage is fo obfolete and monkifh, that it feems as if it would fall more naturally into Englifh of the 16th century, than into that of the prefent times. "But, alas! in thefe our dayes, fome do ftryve to gloffe over theyr lacke of fkyll with filly fayenges. This, cry they, is the *newe* method of difcantynge, thefe be the newe concordes.—Howbeit they grievoufly offend thereby both the hearing, and the underftanding of fuche as be fkylled to judge of theyr defects; for where we look for delight, they do induce fadneffe. O incongruous fayenge! O wretched gloffe! irrational excufe! O monftrous abufe! moft rude and beftial ignoraunce! to take an affe for a man, a goat for a lyon, a fheepe for a fifhe, a fnake for a falmone! For in fuche forte do they confound concordes with difcordes, as ye fhall in no wife difcerne the one from the other. O! if the good old mayfters of former time did hear fuche *difcanters*, what would they fay or do? Out of doubte they wolde thus chyde them and fay, This difcant, whereof ye now make ufe, ye do not take it from *me*; ye do in no wyfe frame your fonge to be concordaunt with *me*; wherefore do ye thruft yourfelves in? ye do not agree with me; ye are an adverfary, and a fcandal unto me. O that ye wolde be dumb! This is not *concordynge*, but moft doatynge and delyrious *difcordynge*."

Concerning the writings upon various fubjects by John de Muris that are ftill preferved among the manufcripts of the Bodleian and Mufeum libraries, we fhall tranfcribe the account given in Tanner's Bibliotheca Britannica, p. 537, which is fo ample as to need little addition.

"John de Muris, or Murus, an Englifhman, and an eminent philofopher, mathematician, and mufician, wrote "Ex Stellarum Pofitionibus Prophetiam." Lib. i. Infra Annum certe Mundi. "Arithmeticam Speculativam." Lib. i. MS. Oxon. in Bibl. Publ. Impreff. Mogunt. "Tractatum Muficum." Lib. i. Quoniam Mufica eft de Sono relato ad Numeros. MS. Bodl. N. E. F. 10, 11. "Artem componendi (metiendi) fiftulas Organorum fecundum Guidonem." Lib. i. "Cognita confonantia in Chordis. Ibid." "Sufficientiam Muficæ Organicæ editam (ita habet MS.) a Mag. Joanne de Muris, Mufico Sapientiffimo, et totius orbis Subtiliffimo experto." Pr. Princeps Philofophorum Ariftoteles. Ib. "Compofitionem Confonantiarum in Symbolis fecundum Boëtium." Pr. Omne Inftrumentum Muficæ. Ib. "Canones fuper Tabulas Alphonfinas." Pr. Quia fecundum Philofophum, 4to. Phyficorum. MS. Bodl. Digby 168. f. 132. "Collectionem Prophetiarum de Rebus Anglicis, per Joh. de Muris." MS. Cotton. Vefpaf. E. VII. 8. In MS. Bodl. Digby 190. fol. 72. extat "Prologus in Opus, cui Titulus; Tractatus Canonum minutiarum Philofophicarum et Vulgarium, quem compofuit Mag. Johannes de Muris, Normannus A. MCCCXXI. a quo eodem anno (verba funt autoris) Notitia Artis Muficæ proferendæ et figurandæ tam menfurabilis quam planæ, quantum ad omnem modum poffibilem difcantandi, non folum per integra, fed ufque ad minutiffimas fractiones:" "Cognitioque circuli quadraturæ" perfectiffime demonftratæ: "Expofitioque tabularum Alphonfi" regis Caftelliæ: et "Genealogiæ Aftronomiæ" nobis claruit, &c. "Canones de Eclipfibus." Pr. In oppofitione habenda aliud. MS. Bodl. Digby 97. ubi habetur hæc nota: Hos Canones difpofuit Joannes de Muris Parifiis in A. MCCCXXXIX. in Domo Scolarium de Sorbona. "De Conjunctione Saturni et Jovis," A. MCCCXLV. Pr. Tres Principes ex Militia. MS. Bodl. Digby 176. Bal. XI. 74. Pits. App. p. 872. feq."

As all the tracts in the lift of his writings which concern mufic have been carefully examined, we will endeavour to convey to the reader an idea of their contents.

The tract which begins "Quoniam Mufica eft de Sono relato ad Numeros," is now marked Bodl. 300. It is a treatife of Harmonics, in which the circular and conical diagrams and divifions of the fcale are innumerable. The author is as fond of the circle in this work, as Tartini was four hundred years after. The tranfcriber has, however, omitted many of thefe illuftrations of his doctrines, by which, perhaps, the injury to mufical ftudents of the prefent age is not very confiderable. "Explicit Mufica Magiftri Joannes de Muris."

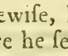
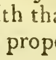
What follows in the manufcript is manifeftly a continuation of the fubject, and a fecond part of the preceding tract. It begins thus: "Princeps Philofophorum Ariftoteles ait in Principio Mathematicæ fuæ omnino Scientis Signum eft poffe docere." We find after the introduction a repetition of the initial fentence of the firft part: "Quoniam Mufica eft de Sono relato ad Numeros." This part, however, relates more to the practice of mufic than the other.

In his chapter "De Tempore perfecto et imperfecto," he feems to call common time perfect, and triple time imperfect: for, he fays, "quod longa poffit imperfici per brevem. Brevis per femibrevem. Semibrevis per minimam. Quod minima non poffit imperfici." However, by thefe words, he, perhaps, only means to fay that a long, which by itfelf is perfect, or equal to three breves, by pofition may be rendered imperfect, that is, equal to two breves only, by a breve, the next fhorteft note being placed after it; and fo a breve, which alone, or with other breves, is triple, becomes double by a femibreve following it. What he means by faying that a minim cannot be imperfected in the fame manner, is, that there was no fhorter note, the crotchet not being then invented, to perform the operation. In his Diagrams of Mufical Proportions, or Time Tables, he gives but four

kinds of notes; that is, in four columns; for in these are manifestly five distinct forms of characters: as  .

The scale of Guido, in a perpendicular diagram; and the hexachords, which are well arranged under their several denominations of durum, naturale, and molle, are exhibited in this tract.

In the tract by John de Muris, beginning "Quilibet in arte," which we unexpectedly found in Be'net college, Cambridge, in the same volume as Odington's treatise, the notes are divided into five classes: "Quinque sunt partes prolationis, videlicet, maxima, longa, brevis, sembrevis et minima," ut hic —giving the same characters as in the tract just mentioned: and here, likewise, his doctrine agrees with that in his other treatise, where he seems to call the triple proportions imperfect, and the dual perfect.

This is the most ancient manuscript in which we have found the signs of the modes, C ₵ ○ ⊙, and the "punctum perfectionis." Here it plainly appears that the punctum, or point, in John de Muris, operates in the same manner as that already described in Franco, p. 187, where it makes the note to which it is prefixed *perfect*, that is, of three times; and the calling it "punctum perfectionis," or point of perfection, prove its power of making a double quantity triple, as at present. At the bottom of fol. 6. is written, "Explicit tractatus Joannis de Muris:" however, it goes on for fifteen pages more. Here, too, we first saw an open, or white minim,  and a half lozenge note . The ink is pale, and the writing very bad, and difficult to decipher; but the manuscript, which is written on paper of a coarse texture, seems entire, and corresponds in every particular with that in the Vatican library, No. 5321. It was this treatise which Prosdocimo de Beldemandis of Padua, a voluminous writer on music in the beginning of the fifteenth century, thought of sufficient importance to merit a commentary, which is now in the possession of Padre Martini of Bologna. "Practica Mensurabilis Cantus," Mag. Joan. de Muris, de Normandia, alias Parisiensis, cum exposit. Prosdocimo de Beldemandis Patav. MS. an. 1404.

The tract by J. de Muris, in the Bodleian library, upon the measures, and proportions of organ-pipes, according to Guido, beginning "Omne instrumentum musice," is very short, and contains nothing very important to music at present. It is not known that Guido ever wrote on the same subject, and de Muris only means by "secundum Guidonem," to say that he has followed the same proportions which Guido established in his division of the monochord.

In another short tract of the same volume he follows Boethius. And in his "Tractatus Canonum minutiarum Philosophicarum et vulgarium," where he tells us that he had composed at the same time "a Treatise on the Art of Music," teaching and describing in figures or notes both measured and plain-song, with every possible kind of discant, not only by integers or long-notes, but by the shortest and most minute fractions, he probably alludes to his "Speculum Musicæ," in seven books, which seems the most voluminous of all his writings, but the invention of the Characters for Time, which has been given to de Muris, by almost all the writers on music of the two last centuries, and whom many English authors seem ambitious of claiming as their countryman, probably with the hopes of honouring this kingdom with his invention of the time-table. But however patriotic may be their design, we are in possession of such a stubborn proof, from his own acknowledgment, of that discovery not being his property, as he would be unable to refute, if he could rise from the tomb and claim it.

Among the MSS. which were bequeathed to the Vatican library by the queen of Sweden, there is a "Compendium of Practical Music," by John de Muris, in which he treats of musical characters for time; but introduces the subject with a short chronological list of anterior musicians who had merited the title of *Inventors*: beginning, as usual, with Tubal; and, after naming Pythagoras and Boethius, he proceeds to Guido, the monk, "who constructed the gammut, or scale for the monochord, and placed notes upon lines and spaces; after whom came Magister Franco, who invented the figures, or notes, of the Cantus Mensurabilis."—Deinde Guido monachus qui compositor erat gammatis qui monochordum dicitur, voces lineis, et spaciis dividebat. Post hunc Magister Franco, qui invenit in cantu mensuram figurarum. MS. Reginæ Sueciæ in Vatic. No. 1146. "Compendium Joannes de Muribus."

With respect to the dispute concerning the place of his nativity, though Tanner, copying Pits and Bale, calls him an Englishman, yet we find that in the title of one of the manuscripts of the Bodleian library, in Tanner's list, he is called a Norman, and in another a Parisian. Padre Martini likewise quotes a manuscript of the year 1404, in which he is called the Great John de Muris, de Normandia, alias Parisiensis.

Having taken some pains to trace the opinion of his being an Englishman to its source, we have been able to find no such title given to him in any of his numerous writings that have been preserved in manuscript throughout Europe. The assertion rests entirely on Robert Record, a physician at Cambridge, and one of the first writers upon science in the English language. His works were very voluminous, of which, however, little more remain than the titles preserved in Pits' account of him, which says, that he was living in 1552. (Append. Illust. Ang. Script. tom. i. p. 872.); at least, we have never been able to procure any of his writings, except his Arithmetic, printed in black letter 1543. And as John de Muris had written on the same subject (Arithmeticam Speculativam, lib. duos,) we had hopes of meeting in this tract the place where Record calls him an Englishman; but no such could be found.

Pits, (loc. cit.) calls him an English mathematician, and says, "he was a man of some genius, but possessed of too daring a curiosity; for, while he was studying philosophy, he addicted himself to mathematics, and to that more sublime part of astronomy which contemplates the heavens: and in the exercise of his genius for calculation, he had the insolence to predict future events; thus persuading the ignorant and vulgar, that by the aspect of the stars he could penetrate the decrees of Providence. He dared to publish celestial secrets under the title of Prophetiarum, prophecies."

These particulars, and many more, he says, were collected from Robert Record. But neither from him nor any one else was he able to discover at what time he lived. Bale, who calls him a mathematician and a conjurer (*Mathematicus et Vates*) gives the same authority for his being an Englishman.

This bare assertion, made at a time when it was not so customary to give or expect proofs and critical exactness in support of facts as at present, has not only been copied, without farther enquiry by Pits, Bale, and Tanner, at home, but by Fabricius and other respectable writers on the continent. A Latin distich, by an anonymous writer, which has been quoted in favour of this opinion, can add but little to its weight, when it is known to come from the most ignorant

and monkiſh of writers, the author of a treatiſe "De Origine et Effectu Muſice," written 1451; who tells us that "Cyrus lived ſoon after the deluge; that one king Enchiridias was a writer on muſic," miſtaking, I ſuppoſe, ſome Enchiridion which he had ſeen, for the name of a royal author: And that "Thubal kept a blackſmith's ſhop, at which Pythagoras adjuſted the conſonances by the ſound of his hammers." But ſuch authority will be found no more to prove J. de Muris an Engliſhman, than Guido or Franco, as both thoſe writers equally contributed to the progreſs of muſic in this kingdom; and it may as well be inſiſted upon, that, becauſe Metaſtaſio has enriched this country with many beautiful ſongs, he muſt conſequently be a native of England.

That monks and perſons of learning, for many centuries before the Reformation, w re more frequently diſtinguiſhed by the name of the place which gave them birth joined to their baptiſmal appellation, than by their family name, is moſt certain: as Guido Aretinus, Geoffry of Monmouth, Henry of Huntingdon, William of Malmſbury, John of Saliſbury, Mathew of Weſtminſter, &c. who have been always ſuppoſed natives, or, at leaſt, inhabitants, of the ſeveral places by which they were called. Now, though no town in Normandy of the name of Meurs can be found, either in maps or geographical books, yet, as there are ſeveral places ſo called in France, particularly one in Touraine, and another in Anjou, near Angers, which by giving birth to our John, ſerved to diſtinguiſh him from his innumerable nameſakes of other kingdoms, cities, and profeſſions; and as no ſatisfactory or probable reaſon has been aſſigned for ſuppoſing him an Engliſhman, nor can any one be now ſuggeſted, except a patriotic deſire of appropriating to our own country a man whoſe learning and talents have been long celebrated, it is but juſt to reſtore him to that country which ſeems to have the faireſt claim to him.

John de Muris, though not the inventor of the "Cantus Menſurabilis," ſeems, by his numerous writings, greatly to have improved it. Indeed, every ſpecies of note to be found in his tracts, except the minim, is deſcribed in Franco, as well as uſed in compoſitions anterior to his time, and mentioned by authors who wrote upon muſic before him. Nor is it poſſible to imagine that this art was invented and received by all Europe at once: like others, it had its beginning, improvements, and perfection, in different periods of time. His "Art of Counterpoint," of which we procured a copy at Rome, though compriſed in a few pages, is, however, the moſt clear and uſeful tract on the ſubject, which thoſe times could boaſt.

He begins, by informing his reader, that, beyond the octave, all is repetition. That, "within the octave there are ſix ſpecies of concord, three perfect, and three imperfect: of the firſt kind are the uniſon, 8th and 5th: and of the ſecond, the two 3ds, and major 6th. The firſt of the perfect kind, he ſays, is the uniſon, which, though by ſome not allowed to be a concord, yet, according to Boethius, it is the ſame, and the origin of all conſonance. The uniſon naturally requires after it a minor 3d; which, on the contrary, for variety, is beſt ſucceeded by a perfect concord. The 5th being of the perfect kind, is well followed by a major 3d, and *è contra*. The octave, another perfect concord, may be ſucceeded by the major 6th; after which, either a perfect or imperfect concord may be taken. It is the ſame with the minor 3d, which, being of the imperfect kind, may be ſucceeded either by a perfect or imperfect concord. The major 3d, though beſt followed by a 5th, yet may be ſucceeded by another 3d, but then it muſt be minor. The major 6th, too, though beſt followed by an 8th, may yet be ſucceeded either by a perfect or imperfect concord of another ſpecies, for the ſake of variety; it can be followed by a fifth only when the under part riſes a major or minor 3d; but by 3ds and 6ths at pleaſure. Every compoſition ſhould begin and end in a perfect concord; and it muſt be remembered that no two parts ſhould aſcend or deſcend in perfect concords, though imperfect may be uſed without limitation: and, laſtly, care muſt be taken, that when the under part aſcends, the upper ſhould deſcend, and the contrary."

Moſt of theſe rules were given by Franco, but with leſs clearneſs and preciſion; and as they will not only ſhew that harmony had made ſome progreſs in the fourteenth century, but are ſuch as would not ſhock modern ears, we ſhall preſent them to the muſical reader in notes.

The minor 6th, we know not why, is called a *diſcord* by Franco, and has no admiſſion among concords, by John de Muris; though it is only an inverſion of the major 3d, which both allow to be a concord.

John de Muris makes no mention of the 4th in this tract, though, in his "Speculum Muſicæ," he gives rules for diſcanting in a ſucceſſion of fourths, under the barbarous term *diateſſaronare*.

DEMY Sangue. See Half-Blood.

DEN, a ſyllable added to the names of places, and ſhews their ſituation to be in a valley, or near woods, as Tenterden, Biddenden, &c.

The word is Saxon *den*, *i. e. vallis*, or *locus ſylveſtris*.

Den *and ſtrond*, &c. in *Law*, was a liberty for ſhips or veſſels to run or come a-ſhore. King Edward I. by charter, granted this privilege to the barons of the cinque ports.

DENA, in *Geography*, a river of Hindooſtan, S.E. of Adjodin, being one of the four branches of the Setlege (probably the Dond), and, perhaps, ſays Mr. Rennell, the only principal one among them, except the Beyah.

DENAIN, a ſmall town of France, in the department of the North, near the river Scheldt, between Valenciennes and Bouchain, remarkable for its abbey, founded by a daughter of king Pepin, and for a victory gained in its neighbourhood by the French, under the duke of Villars in the year 1712, over the allies, after the departure of the Engliſh.

DENARIATUS Terræ, in *Ancient Law-Books*, as much land as is worth a penny by the year. See Farding-*deal*.

"Sibylla

"Sibylla Barthelot tenet unam acram, & 5 *denariatos* terræ in eodem tenemento." Du-Cange.

DENARII, in *Antiquity*, a general term for any ſort of *pecunia numerata*, or ready money. Paroch. Antiq. 320.

DENARII *de Caritate*, cuſtomary oblations made to cathedral churches about the time of Pentecoſt, when the pariſh prieſts, and many of their people, went in proceſſion to viſit their mother church. This cuſtom was afterwards changed into a ſettled due, and uſually charged upon the pariſh prieſt; though at firſt it was but a gift of charity, or preſent, for helping to maintain and adorn the biſhop's ſee. Cartular. Abb. Glaſton.

DENARIUS, the Roman penny; a ſilver coin, equivalent to, from ſix to eight-pence half-penny ſterling. See COIN.

The Romans having, for a long time, uſed braſs money, which they call *as*, quaſi *æs*; or *libra* and *pondo*, becauſe it was a pound weight; began in the year of Rome 485, or 269 years B.C. to coin ſilver; and coined firſt the denarius, which was marked with the letter X, becauſe it is worth ten aſſes, whence its name, and divided into two quinarii, marked with V, which were ſubdivided into two ſeſtertia, marked with theſe three letters IIS. The as was then of 3 ounces, and allowing, which was probably the caſe, that theſe large denarii of 90 grains at a medium, are of the firſt coinage, the proportion of copper to ſilver was as 1 to 160. Afterwards, when the denarius was of 60 grains at a medium, and the as of 2 ounces, copper was ſtill to ſilver as 1 to 160; but when the as fell to only an ounce, copper was to ſilver as 1 to 80; and when it fell to half an ounce, and 16 went to the denarius, it was as 1 to 64, at which rate it remained. With us copper to ſilver is in coinage 1 to 40; but in actual value 1 to 72. The denarius was worth eight-pence of our money, the quinarius four-pence, and the ſeſtertius, whether ſilver or braſs, two-pence. Afterwards, about the year 579, or 175 years B.C., when the as fell to half an ounce, the ſilver denarius was made to paſs for ſixteen aſſes, the quinarius for eight, and the ſeſterce for four; but in the pay of the army, the ſoldier generally received a ſilver denarius for ten aſſes, (Pliny, Nat. Hiſt. lib. xxxiii. cap. 3. Livy, lib. xv) though not without ſome variations and deductions. The denarius continued at this value till the time of Gallienus. Under Caracalla, or probably under his predeceſſor, Severus, who firſt debaſed the ſilver coinage, there were denarii ſtruck of two ſizes. The large denarius of Caracalla, and his ſucceſſors, is one-third heavier than the uſual one, and it may be reaſonably concluded that it bore one-third more value; and was worth 6 braſs ſeſtertii, while the other retained its firſt value of 4. This large denarius of courſe had 24 aſſaria; and it is called by the writers of the Auguſtan hiſtory, and in reſcripts of the period, *Argenteus*, or the ſilver piece, and *Argenteus Philippus*, or the ſilver Philip, the word *Philip* having become a familiar appellation for any coin. The common denarii now firſt began to be termed *minuti*, and *argentei Philippi minutuli*, and the like, to expreſs their being ſmaller than the others. The firſt *argenteus* is worth nearly one ſhilling ſterling.

From the time that Caracalla ſtruck the large denarius, both it and the ſmall had been leſſening by degrees; till after Gordian III. the latter totally vaniſhed, and the large alone remained. This, in the time of Gallienus, was the ſole denarius of ſilver, and ſo much diminiſhed, as only to equal the *minutus*, or ſmall one, of Caracalla. But Gallienus introducing the *denarii æri*, which was copper waſhed with ſilver, and of the ſize of the denarius, inſtead of the ſeſtertii, the *argenteus*, though reduced more than a third in ſize, bore 6 *denarii ærei*, its old ſtandard of *ſeſtertii*. Writers of the period, and after, ſay, that the *denarius*, or *argenteus*, was of 60 aſſaria; hence it follows that each *denarius æreus* had 10; and received its name from that circumſtance, as well as its being of the ſize of the ſilver denarius. Theſe aſſaria are of the ſize of the argentei; and ſhew that copper retained its old proportion to ſilver of about 1 to 60. The denarii or argentei continued to be coined in the time of Conſtantine I., and were the money moſt common in currency. As they had been rated at 100 to the pound of ſilver in tale, they began to be called *centenionales*, or *hundreders*. They then diminiſhed very faſt in ſize; thoſe of Conſtantine I. and II., Conſtans, and Conſtantius weigh 50 grains down to 40; thoſe of Julian II., Jovian, 40 down to 30; thoſe of later princes, till Juſtinian, 30 to 20. Under Heraclius, when they ceaſed, the denarii were from 15 grains down to 10. The miliarenſis, which was ſubſtituted by Conſtantine in the room of the denarius, attends the denarius in proportional decline of ſize. See MILIARENSIS and POUND.

The moſt ancient denarii have on one ſide the head of a woman in a helmet, with the inſcription ROMA, and the mark of the denarius X or 𐆖, and ſome few XVI, and a biga or quadriga on the other; whence they are denominated bigati and quadrigati. The next to theſe in antiquity, have the head of Roma, or ſome other deity, on one ſide, and on the reverſe the name of the mint-maſter, with hiſtorical or emblematical figures. Many of theſe have the mark X or 𐆖, which remained long after the denarius paſſed for 16 aſſes. A third ſort have the head of a conſul or general on one ſide, with an hiſtorical or emblematical reverſe: few of theſe have the mark X or 𐆖, upon them. Theſe three ſorts are called conſular denarii, becauſe they were ſtruck during the republican government by conſuls. The imperial denarii have commonly the head of the reigning emperor, with his names and titles on one ſide, and ſome emblematical figures on the reverſe, with ſuitable inſcription. The Romans did not uſe the denarius for a weight, as the Greeks did their drachm, till the Greek phyſicians coming to Rome, and finding the two coins nearly equal, preſcribed by it, as they had been uſed to do by the drachm in their own country.

We are informed both by Celſus and Pliny, that eighty-four denarii were coined out of the pound of ſilver; and therefore by determining the true weight of the Roman pound, we ſhall obtain that of the denarius, which depended upon it. But the Roman pound in tale exceeded it, in like manner as our pound in tale falls ſhort of our pound in weight; the Roman pound in tale conſiſted of 100 denarii. Celſus de Medicina, lib. v. cap. 17. Pliny, Nat. Hiſt. lib. xxxiii. cap. 9.

If we take 5040 troy grains for the weight of the Roman pound, as determined from the gold coins, the conſular denarius of 84 in the pound will weigh juſt 60 troy grains. Mr. Raper took the mean weight of forty-ſix of the faireſt denarii in the Britiſh Muſeum, and found it to be 60.95 troy grains; but as ſome of theſe were imperfect, he found the mean of twenty perfect denarii to amount to 60.92: and he queſtions whether the denarii of above ſixty-three grains ever paſſed as current coin. The weight of the denarius was diminiſhed under the emperors; and Greaves found, by examining many imperial denarii, that from Auguſtus's time to Veſpaſian they continually almoſt decreaſed, till, from being the ſeventh part of the Roman ounce, they came now to be the eighth part; and ninety-ſix were coined out of the Roman libra, whereas under the conſuls they coined only

eighty.

eighty-four. Under Severus and Gordianus they recovered their weight, but with a confiderable mixture of allay. J. Cafpar Eifenfchmid of Strafburg, in a book "De Ponderibus et Menfuris Veterum," &c. publifhed in 1708, informs us, that he found the weight of the imperial denarius from Nero to Sept. Severus, to be to the confular denarius in the proportion of 7 to 8.

In order to determine the value of the confular denarius of 60 troy grains of fine filver, we are to confider, that fixty two Englifh fhillings are coined out of eleven ounces two penny weight, troy, of fine filver, and eighteen penny weight allay; and therefore the troy grain of fine filver is worth $\frac{62}{111}$ths of a farthing; and fixty grains, or the denarius, worth fomewhat more than eight-pence farthing and a half fterling; and the as, or fixteenth part of the denarius, a little more than a half-penny. Phil. Tranf. vol. lxi. part. ii. art. 48.

Others, as Greaves, and after him Arbuthnot, have made the confular denarius the feventh part of an ounce in weight, a little more than fixty-two grains, allowing 5256 troy grains to the Roman pound, and its value, allowing eight Englifh grains to the filver penny, $7\frac{3}{4}d.$ of our money; and the imperial denarius the eighth part of an ounce, and worth about $6\frac{1}{2}d.$ fterling.

M. Tillemont obferves, that the denarius was held fufficient to keep a perfon handfomely for a day; and, upon the whole, feems to intimate, that it was equal to twelve French fous, or eleven Englifh pence; but this eftimate errs in excefs more than the preceding does in defect. See Greaves's Difcourfe of the Denarius, in his works, by Dr. Birch. vol. i. p. 235, and Arbuthnot on Coins, p. 15.

Denarius is alfo ufed, in our *Law books*, for an Englifh penny.

"Denarius Angliæ, qui nominatur fterlingus, rotundus fine tonfura, ponderabit 32 grana frumenti in medio fpicæ; & 20 denarii facient unciam; & 12 unciæ facient libram." Stat. Ed. I. De menfuris.

Denarius *Dei* denotes earneft-money; called alfo argentum Dei, by the French deniers de Dieu, and in fome parts of our country arles.

"Ita quod neuter mercatorum ab illo contractu poffit difcedere, vel refilire poftquam denarius Dei inter perfonas contrahentes datus fuerit & receptus." Charti Eduardi I.

Denarius *tertius comitatus*, denoted a third part of the profits of county courts. When thofe courts had fuperior jurifdiction, before other courts were erected, two parts of the fines, and other profits belonging to them, were referved to the king, and a third part to the earl of the county. Paroch. Ant. 418.

Denarius *Sti. Petri*. See Peter-pence.

DENAROS, in *Ancient Geography*, an ifland fituated at the eaftern extremity of the ifle of Cyprus, near the promontory Dinerratum.

DENAT, in *Geography*, a fmall town of France, in the deparment of the Tarn, on the river Agout; 9 miles S. of Alby.

DENATES, in *Antiquity*, domeftic gods, more frequently called *Penates*: which fee.

DENAVACA, in *Geography*, a town of the ifland of Ceylon; 50 miles S. of Candy.

DENBERA, in *Antiquity*, from the Saxon *Den*, a vale, and *berg*, a hog, denoted a place for the rearing and feeding of hogs, in which they are penned; called by fome a *fwinecomb*.

DENBIGH, in *Geography*, the county town of Denbighfhire, North Wales, is fituated on the fide and at the top of a craggy and lofty hill, which rifes out of the beautiful and fertile vale of Clwyd. This place was called by the Britons *Cledfryn yn Rhos*, or the craggy hill in Rhos. This part of the county was given by Edward I. to David ap Gruffydd, brother to Llewelyn the laft prince of North Wales, who being afterwards beheaded for high treafon, it was given to Lacy, earl of Lincoln, who fortified the town with a ftrong wall, and either built, or enlarged the caftle; but his only fon being unfortunately drowned in the well of this caftle, his grief was fo great that he was induced to leave it unfinifhed. After the earl's death, it went by the marriage of his daughter Alice, into the poffeffion of the family of the houfe of Lancafter. Edward II. gave it to Hugh Spencer; after which, in the reign of Edward III., Roger Mortimer became the poffeffor, and fixed his arms on the chief gate; but he being executed for high treafon, it went to Montague, earl of Salifbury, and was foon afterwards reftored to the Mortimers. After many changes it came to the houfe of York, and now belongs to the crown. Charles I. refided in it fome time. It was delivered up to the parliamentary army in 1646, and appears to have been a place of fuch ftrength, that after the reftoration it was thought advifable to blow it up. The ruins of the caftle are ftill to be feen on the fummit of a rock, which flopes on all fides but one, which is a precipice. The principal part of the caftle was built anno 1280, temp. Edward I. The grand entrance was through a large gate, with a pointed arch, flanked by two octagonal towers. The caftle feems to have been of a fingular conftruction: two walls being built feveral feet afunder, the intervening fpace was filled up by pouring in a mixture of mortar and rough ftones, which formed, in drying, a mafs as folid as the rock itfelf. The profpect from the caftle is particularly grand and delightful, commanding an extenfive reach of the banks of the Clwyd, interfperfed with gentlemen's feats. Denbigh is a borough town, governed by two aldermen, a recorder, two bailiffs acting as fheriffs, and twenfive capital burgeffes, who form a common council. The aldermen are juftices, and hold quarter-feffions in the fame manner as the county feffions are held, by ftatute. The borough returns one member to parliament: the election is vefted in the refident burgeffes, in number about five hundred; the bailiffs are the returning officers. The political influence is entirely in the Middleton family, of Chirk-caftle, whofe anceftors have reprefented the borough in various parliaments from 33 Henry VIII. to the prefent time. The town is not large, but generally well built, and contains 534 houfes and 2391 inhabitants, of whom 794 were returned as being employed in trade and manufacture, particularly of fhoes, gloves, and other articles of leather, in which commodities the town carries on a confiderable traffic. Denbigh gives the title of earl to the noble family of Fielding. Near the caftle ftands the chapel of St. Hilary, which is the common place of worfhip for the inhabitants of the town; as the parifh church and burial ground are about a mile diftant in the bottom of the vale. Near the lower end of the town, in the parifh of Henllan, ftood a priory of White Friars; but little of it remains except a part of the church, now converted into a barn. Here are alfo the ruins of an abbey of Black Monks of the Benedictine order, founded and endowed by Adam Salufbury, in the reign of Henry III. Denbigh is diftant from London 218 miles N. W. Evans' Cambrian Itinerary.

Denbigh, *Cape*, a point of a peninfula, on the American coaft, fouth of Norton Sound, obferved in captain Cook's third voyage in 1778, firft fuppofed to be an ifland, but afterwards found to be united to the continent by a low neck of land, on each fide of which the coaft forms a bay. N. lat. 64° 30′. E. long. 198° 30′. The captain had fome

intercourse with the natives, who exchanged a few dry fish for such trifles as they could procure; but they were most desirous of knives, and had no dislike of tobacco. Lieutenant Gore, who was sent to examine the peninsula, found there was little fresh water, and that the wood was difficult to be obtained, as the boats grounded at some distance from the coast. To the southward of cape Denbigh, was an island named " Besborough island," S. 52° E., 15 leagues distant. The adjacent country, where there was no wood, was covered with heath and other plants, some of which produced abundance of berries. The underwood, such as birch, willows, and alders, rendered it troublesome walking amongst the trees, which were all spruce, and none of them above 6 or 8 inches in diameter. All the drift-wood in these northern parts was fir. The natives in their size and features resembled those whom the voyagers had met with on every other part of the coast, King George's Sound excepted. As they approached the ship, they sang, while one of their number beat upon a kind of drum, and another made a thousand antic motions with his hands and body; but there was nothing savage either in the song, or in the gestures that accompanied it. Their clothing consisted principally of deer-skins; and they observed the custom of boring their under lips, and fixing ornaments to them. Their habitations, seated close to the beach, consisted simply of a sloping roof, without any side walls, composed of logs, and covered with grass and earth. The entrance was at one end; the fire-place just within it; and a small hole near the door let out the smoke. Although they had some beads, the article which they seemed chiefly to value was iron; and for four knives made out of an old iron hoop, they gave 400 pounds weight of fish, some being trout, and the rest in size and taste between a mullet and herring. The berries procured here were wild currant-berries, hurtle-berries, partridge-berries, and heath-berries. The low land connecting this peninsula with the continent was full of creeks, and abounded with ponds of water, some of which in the month of September were frozen over. Here were a great many geese and bustards, some snipes, and on the high ground partridges of two sorts. In the wood, musquitoes were in great plenty. This peninsula seemed to have been in remote times an island; for there were marks of the sea having flowed over the isthmus, and it appeared to be kept out by a bank of sand, stones, and wood, thrown up by the waves. Cook's Third Voyage, vol. ii. p. 485. See NORTON's *Sound*.

DENBIGHSHIRE, a county of North Wales, is bounded on the west by Caernarvonshire; on the north by the Irish sea; on the east by Flintshire, Cheshire, and Shropshire; and on the south by Merionethshire and Montgomeryshire. This district is divided into six hundreds; and extends from north-north-west to south-east about thirty-nine miles; while its greatest breadth from east to west does not exceed twenty-three miles. This extent is not accurately ascertained, as there has never been a correct survey of the county. Mr. Kay, who drew up a concise agricultural report respecting Denbighshire, states, that it contains about 410,000 acres of land, the greater part of which is rugged and mountainous, but the lower grounds being inclosed, and in general well wooded, with a great variety of very rich valleys interspersed, considerably soften its appearance. The soil is various, consisting of gravel, clay, and loam; chiefly loamy gravel and ebb shale. The air is salubrious; and the inhabitants in general long-lived. The principal rivers are the Clwyd and the Conway; the former passes through the vale of the same name; whilst the latter is the boundary between this county and Caernarvonshire. All the country about Wrexham (the most populous, and largest town in North Wales, lying on the eastern parts of this county,) is beautifully variegated. Chirk castle, the seat of Mr. Middleton, within twelve miles from Wrexham, is pleasantly situated on a rising ground, commanding a most extensive view, although surrounded with large and very valuable plantations. Wynstay, the seat of sir Watkin Williams Wynne, which lies half-way between Chirk and Wrexham, is also a most delightful situation, with extensive old plantations; besides a great number of other gentlemen's seats, all of which are encompassed with fine woods. The banks of the Dee afford excellent pasture and hay. The most extensive valley in this county is the celebrated vale of Clwyd, in which are a number of towns, villages, and gentlemen's seats. It is above twenty miles in length, and from three to eight miles in breadth, according to the approach or recess of the mountains, with which it is guarded on all sides except on the north. This vale is in general in a high state of cultivation; though the western parts are more barren, except on the sea coast. The crops principally cultivated are wheat, oats, barley, and peas, with red and white clover, and rye-grass, potatoes, and a few turnips. Denbighshire contains 57 parishes, and 12,621 houses, inhabited by 60,352 persons, of whom 6,960 were returned as being employed in trade and manufacture, and 21,104 in agriculture. Wool is the principal object of manufacture of the county, and is wrought into cloths of different qualities, and also into stockings, particularly those called Angola hose. Near the village of Chirk are a foundery for cannon, and also some iron forges. The borders of the county afford some lead mines; and in the south-western parts coal-pits are worked. The chief products of this county are cattle, corn, and cheese: the latter in some parts, particularly in the fine pasture land on the banks of the Dee, is equal in quality to that made in Cheshire. Denbighshire returns two members to parliament; one for the county, and one for the county-town. It lies partly in the diocese of St. Asaph, and partly in that of Bangor. " Kay's General View of the Agriculture of North Wales." " Evans's Cambrian Itenerary."

DENCHE', DENCHEA, or *Endenché*, in *Heraldry*. See DANCHE'.

DENDER, in *Geography*, a river of Flanders, which runs into the Scheldt at Dendermond.

DENDERA, the ancient *Tentyris* or *Tentyra*, a town or large village of Egypt, built near the ruins of the ancient city at a short distance from the west bank of the Nile, at the extremity of a very fertile plain, about 242 miles S. of Cairo, and 48 S.S.E. of Girgé. The surrounding orchards, which produce excellent oranges, lemons, pomegranates, grapes, and figs, render it a charming place, and afford a delightful coolness in a scorching country. A forest of palms and fruit-trees, mentioned by the ancients, still exists in its environs, and furnishes the greatest part of the charcoal that is consumed in Egypt. An Arabic prince, with the title of emir, has a sovereign authority over Dendera and the circumjacent country; but he pays a tribute to the beys of Cairo. The site of Tentyris, which was formerly a celebrated city of Egypt, and gave its name to the nome Tentyritus, of which it was the capital, is little more than a quarter of a league from the present village of Dendera, towards the mountains to the westward. This city was of great extent, and, from its splendour, was reckoned one of the most considerable cities. Isis and Venus were here honoured with public worship; and a temple was consecrated to each of those divinities. But what rendered this place more particularly remarkable was the enmity which the inhabitants had sworn to crocodiles, and the continual war which they waged against those hideous reptiles. The Tentyrite

tyrite purfued the crocodile into the water, overtook him, leaped upon his back, and ran a ftick into his mouth, with which, as with a bridle, he brought him to the fhore, where he put him to death. In the midft of ruins and rubbifh, occupying a great fpace of ground, and attefting the grandeur and magnificence of ancient Tentyris, there is ftill ftanding a temple, entire, and in good prefervation. It was dedicated to Ifis; and this tutelary divinity was there worfhipped in the fhape of a cat. This temple is in the form of an oblong fquare, and is built of white ftones, taken from the calcareous rocks of which the neighbouring mountains confift. The façade is 132 feet and fome inches in length. In the middle of the cornice, below the corona, is a globe refting upon the tails of two fifhes. The large veftibule is fupported by enormous columns, which are 21 feet in circumference. Their capitals are of a fingle piece, and reprefent heads or broad faces placed oppofite to each other, and upon a feftooned drapery; over them are fquare blocks, which project beyond the figures, and have fome refemblance to pannels. The interior of the building is divided into feveral apartments, the walls of which are covered with hieroglyphics and fymbolical figures. The exterior walls are alfo charged with them. Thefe figures are very remarkable images, and fuch as are not to be found on any other monuments of ancient Egypt. Three perfons are feen, who form part of an Ifiac proceffion. Behind each of thefe figures is a row of hieroglyphics; which, if they were underftood, would probably explain the different attributes diftinguifhing thefe feveral perfonages. The Egyptian figures which have tails are cynocephali (dog-headed) or other monkies; having a human form, with appendages affimilating them to animals. The flowers are probably thofe of the lotus, or water-lily, a plant which was famous in Egypt, as a proof of the neceffary overflowings of the Nile, and as one of the moft common articles of fubfiftence of the inhabitants. The figure of Ofiris or Ifis has the head of a fparrow-hawk; but it is impoffible to determine whether it be a man or a woman. Its head-drefs is compofed of the fun's difk and the lunar crefcent; it holds in one hand the *thau*, or handled crofs, and in the other, a fceptre capped with a fection of the fruit of the Egyptian arum (arum colocafia) one of the plants moft in ufe for the fuftenance of the inhabitants of Egypt. Here is obferved a fceptre furmounted by a fleur-de-lis, adopted by the kings of France for their coat of arms. This feems to have been the emblem of power among feveral ancient nations in the Eaft. Herodotus and Strabo relate, that the kings of Syria and Babylon formerly bore the fleur-de-lis at the end of their fceptre. The cieling of part of this temple is painted in frefco, of the brilliant azure blue colour, with which, in fine weather, the canopy of heaven is adorned; the figures in relievo, with which this blue ground is interfperfed, have been painted of a beautiful yellow; and thefe paintings, at the expiration of fome thoufands of years, ftill poffefs a brilliancy to which our prefent colours cannot be compared, and they are ftill as bright as if they had been recently laid on.

We have already obferved, that the façade of this temple is more than 132 feet in length. The depth of the periftyle is 115 feet 3 inches, and its breadth 60 feet 11 inches. The two fides of the edifice are 254 feet 9½ inches in length; and the depth is 110 feet 11 inches. The roof of the temple is flat, and formed of very large ftones, placed from one pillar to another, or from a wall to a pillar, or refting upon two party-walls. Several of thefe blocks are 18 feet long, and 6 broad. Such is the deplorable change that has taken place in Egypt with regard to the arts, which had their birth here, and which had arrived at a high degree of perfection, that a number of figures have difappeared in this wonderful monument of ingenuity, under the efforts of that deteftation which modern barbarians have vowed to the arts, in general; and, in particular, to reprefentations of animated nature. All the figures, within their reach, are in a great meafure deftroyed. Several Greek and Roman copper medals and engraved ftones, as well as other fragments of antiquity, and emeralds, are very commonly found in the ruins of Tentyris. According to the aftronomical obfervations made by Mr. Bruce, the latitude of Dendera is determined to be 26° 10′. Sonnini's Travels in Upper and Lower Egypt.

DENDERMOND, Dermonde, *Tenermonde*, *Teneræmunda*, but at prefent generally called *Termonde*, is a town of France, in the department of the Scheldt (Efcaut), at the confluence of the river Scheldt and Dender, which traverfes the town; 18 miles S. of Antwerp, 18 miles W. of Malines, and 18 miles N. W. of Bruffels. N. lat. 51° 3′. Dendermond is well fortified, its environs can eafily be laid under water, and fome works which have lately been added, render it very ftrong, and particularly important in time of war to facilitate or to impede the communication between Gand and Antwerp. It is the chief place of a diftrict of the fame name, and counts 5028 inhabitants. Its canton has an extent of 90 kiliometres, 11 communes, and a population of 18875 individuals. The whole diftrict contains 11 cantons, 73 communes, 180,516 inhabitants, and a territorial extent of 892 kiliometres and a half. The foil is uncommonly fertile, producing all forts of corn, befides hemp and flax. It has excellent paftures, and is remarkable for good horfes.

DENDRANATOMY, from δενδρον, *tree*, and ανατομη, *anatomy*, a term ufed by Malpighi, and others, to exprefs the diffection of the ligneous parts of trees and fhrubs, in order to the examination of their ftructure and ufes. Galen has ufed the fame word, and taken fome pains to difcover fome of the fubjects of thefe refearches. There is a very remarkable analogy between the parts of fome trees, and thofe of peculiar parts of animal bodies; and Malpighi has, with great juftice, ufed the comparative anatomy of trees, to explain, by the formation of the galls, and other preternatural tumors on them, the puftules and other unnatural flefhy excrefcences on animal bodies.

DENDRITES, Dendritical. This term, derived from δενδρον, *a tree*, is applied to thofe cryftallizations of falts and other bodies that affume a ramified appearance. The lateral branches of the dendritically cryftallized falts are generally long and flender, and more or lefs curved; hence they often as much refemble feathers as vegetables, in which cafe they are generally denominated feathery or plumofe. Some of the moft beautiful fpecimens of this kind of cryftallization are exhibited by the froft work that forms on the infide of windows during the winter. Sal ammoniac and nitre may alfo be made to depofit cryftals of great beauty by fpreading a few drops of a watery folution of each on the furface of a plate of glafs, and allowing it to dry gradually.

Of the mineral fubftances, thofe the moft liable to this kind of cryftallization, are native copper, filver, and gold, and the mixed oxyds of iron and manganefe. The latter forms thofe extremely delicate blackifh brown fprigs refembling mofs, and the fmaller kinds of fea-weed by which the furface of many kinds of marble is variegated, and which, when imbedded in agate and chalcedony, form thofe pretty pebbles called Mochoa ftones. It may be obferved by the way that they are thus called not becaufe they come from the town of Mochoa in Arabia, but from a corruption of the German term *mochftein*, mofs-ftone.

DENDROBIUM, in *Botany*, (from δενδρον, *a tree*, and βιος, *life*,)

life,) a genus of plants, belonging to the Orchis tribe, growing parasitically, for the most part, on the trunks or branches of old trees, in tropical countries. Willd. Sp. Pl. v. 4. Swartz. Act. Holm. 1800. p. 244. Tracts on Botany, 197. Schrad. Journal, 1799, 234. t. 2. f. 1. Sw. Orchid. in Schrad. Neues Journ. v. 1. 92. Class and order, *Gynandria Monandria.* Nat. Ord. *Orchideæ*, Linn. Juss.

Gen. Ch. reformed. *Cal.* (in some species reversed,) three-leaved, oblong, somewhat spreading; the two lowermost leaves extended at the base, on their under side, and cohering so as to form a pouch, bearing some resemblance to a spur. *Cor.* Petals two, oblong, lateral; nectary a lip, of various shapes in different species; its base included in, and often connected with, the pouch of the calyx, destitute of a spur; its prominent part occasionally concave or flat, undivided or lobed, generally more coloured than the rest of the flower. *Stam.* Anther an hemispherical terminal deciduous lid, of two or four cells; masses of pollen two or more, globular, yellow, glutinous. *Pist.* Germen inferior, oblong or ovate, erect, furrowed; style columnar, semi-cylindrical, a little incurved, concave in front; stigma a moist, shining, orbicular spot, in the fore part of the style near the top. *Peric.* Capsule oblong or ovate, with three or six angles or ribs, one cell and three valves, bursting between the ribs. *Seeds* numerous, minute, each clothed with a chaffy tunic.

Ess. Ch. reformed. Calyx-leaves forming a pouch with their base. Lip without a spur. Anther vertical. Pollen globose. Flowers often reversed.

* *Flowers direct.*

Sp. 1. D. *palmifolium.* Sw. (Epidendrum palmifolium; Sw. Prod. 123.) "Leaves lanceolate, broad, ribbed, each proceeding from a bulb. Flower-stalks radical, many-flowered." Sw. Found by Dr. Swartz in Jamaica, and known to us by the above characters only. 2. D. *Barringtoniæ.* Sw. (Epidendrum Barringtoniæ; Sm. Ic. Pict. t. 15.) Leaves elliptic-lanceolate, many-ribbed, several proceeding from each bulb. Flower-stalks radical, mostly single-flowered. We believe this magnificent species has never been published but by the writer of the present article, in the work above quoted. Dr. Swartz has taken his characters from thence, he not having met with it in Jamaica, from which island its roots were sent to the late Hon. Mrs. Barrington, in whose fine collection at Mongewell they flowered in April, 1791. The next year the same species blossomed under Mr. Fairbairn's care at Chelsea. The *roots* are, as in the whole genus, perennial and parasitical; consisting of long, thick, round, downy branching fibres, which insinuate themselves into the cracks and cavities of the old rotten bark of trees. *Bulbs* exposed, clustered, ovate, green, smooth, longitudinally furrowed and wrinkled, as large as turkey's eggs. *Leaves* three or four from the top of each bulb, a foot long, sheathing, spreading, of a broad lanceolate, somewhat elliptical, shape, waved, pointed, ribbed, plaited, entire, smooth, of a fine green. *Flower-stalks* radical, few, three inches high, simple, sheathed with scales, each bearing one, rarely two, large and very singular flowers, whose *calyx* and *petals*, each much above an inch long, are green, tipped with a tawny hue, and elliptical. *Lip* rather shorter than the petals, three-lobed, with a thick yellow palate; the side lobes small, thin, acute; the central one large, fringed, orange bordered with yellow. *Style* with its lid white, bent down to the palate. In drying every part turns black. The flowers have no smell. 3. D. *præcox*, (Epidendrum præcox; Sm. Exot. Bot. t. 97.) Leaves lanceolate, three-ribbed; two from each bulb. Flower-stalks terminal, single-flowered. Lip of the nectary tubular, fringed, marked with five rough lines. Found by Dr. Francis Buchanan in Upper Nepal in the East Indies, growing among mosses on the trunks of trees or on rocks. The natives call it *Caybu swa.* *Bulbs* at first small, awl-shaped, invested with scales; afterwards ovate or heart-shaped, and as large as the root of a tulip, green speckled with purple. *Leaves* in pairs from the summit of each bulb, lanceolate, three-ribbed, somewhat stalked, coming after the *flowers*, which grow solitary on a little stalk from the top of (we believe) a distinct, but similar, bulb, and are very large and handsome, purple; their *nectary* rolled up into a tube, its edge fringed and white, its palate marked with five parallel, rough, yellow ribs. 4. D. *humile.* (Epidendrum humile; Sm. Exot. Bot. t. 98.) Leaves . . . . . Flower-stalks radical, single flowered. Lip of the nectary tubular, jagged, hairy, marked with nine elevated lines. Gathered also on the mossy trunks of trees in Upper Nepal, by Dr. Buchanan, who never could find any *leaves.* Its habit is like the last, and probably the *bulbs* bear leaves at their summits, as in that. The *flower stalks* however spring from the root. *Flowers* solitary, flesh-coloured with purple ribs. *Lip* very beautifully coloured internally with yellow and crimson, fringed also and hairy. The two last are most lovely plants, whose bulbs, if they could be procured, would prove a great acquisition to our gardens. 5. D. *sanguineum.* Sw. (Satyrium n. 3; Browne's Jamaica, 324. Viscum radice bulbosâ minus, delphinii flore rubro speciosо; Sloane's Jam. v. 1. 250. t. 121. f. 2.) "Leaves oblong, single-ribbed two from each bulb. Stalk terminal, with several flowers. Petals decurrent along the germen." A native of the West Indies. Browne says it is one of the most beautiful of its tribe, and grows indifferently on all the trees and rocks in the low lands of Jamaica. *Bulbs* about the size of nutmegs, each bearing two rigid, elliptic-oblong, blunt *leaves*, with one channelled rib. *Stalks* terminal, solitary from between the leaves, a span high, divided into a few branches, every one of which bears a purple flower, above an inch in diameter, whose lip is broad and crenate, variegated with yellow and purple. According to Swartz the two *petals* run down the germen, of course within the pouch of the *calyx*, in the form of a spur. 6. D. *moschatum.* Sw. Orch. 94. (Epidendrum moschatum; Buchanan in Symes's Emb. to Ava, t. 26. Thee-kua nee of the Birmans.) Stem creeping, marked with eight furrows. Leaves two-ranked, elliptic. Clusters many-flowered. Petals twice as broad as the calyx. Lip entire. Grows on trees in the East Indian kingdom of Ava. The leafy *branches* are a foot long, with eight furrows, like the main stem. *Leaves* rigid, smooth, elliptic-oblong, obtuse, spreading in two ranks. *Clusters* spreading in an opposite direction to the branches; their stalks round and even. *Flowers* about six in each cluster, large, very fragrant, yellow with a purple spot on each side of the nectary. Buchanan. 7. D. *Myosurus.* Sw. (Epidendrum Myosurus; Forst. Prod. 60.) "Leaves linear, somewhat lanceolate, channelled, slightly emarginate. Flower-stalks naked. Spike filiform, drooping." Sw. A native of the Society islands in the South sea. Forster. 8. D. *utricularioides.* Sw. (Epidendrum utricularioides; Sw. Prod. 122.) "Leaves lanceolate, lineated, flat, stalk panicled. Petals united by their bases into a very short spur, beneath the great inversely heart-shaped lip." Sw. Found by Dr. Swartz in Jamaica and Hispaniola, and his specific character is all the information we have concerning it. 9. D. *testiculatum.* Sw. (Epidendrum satyrioides; Sw. Prod. 123.) "Leaves cylindrical, somewhat tapering. Flower-stalk nearly simple. Flowers with two globose swellings at the base in front." Sw. A native

native of Hifpaniola. 10. D. *punctatum*. Sm. Exot. Bot. t. 12. Leaves radical, very fhort, imbricated. Spike many-flowered. Lip three-lobed, acute, downy. Sent by Dr. White from the neighbourhood of Port Jackfon, New South Wales. *Stems* feveral, two or three feet high, unbranched, round, purple, clothed with a few ftraggling fcales only, and bearing fix or eight fhort, imbricated, ovate, flefhy *leaves* at the bafe. Each ftem terminates in a long fimple bracteated *fpike*, or rather *clufter*, of very numerous and handfome purple flowers, dotted all over with red fpecks, and their germens are befprinkled with purple glands. The *calyx-leaves* and *petals* are lanceolate and acute. *Lip* fcarcely equal to them in length, deeply three-lobed, yellow and downy above towards the bafe. 11. D. *corniculatum*. Sw. (Epidendrum corniculatum; Sw. Prod. 123.) "Stem very fhort. Leaf folitary, oblong, fomewhat wedge-fhaped, flightly ftalked. Flower folitary, with a curved point." Sw. A native of Jamaica. 12. D. *lanceolatum*. Sw. (Epidendrum Lanceola; Sw. Prod. 123.) "Stem very fhort. Leaf folitary, lanceolate, ftalked. Stalks two-flowered." Sw. This minute fpecies forms little tufts, each plant confifting of a *ftem* about half an inch high, bearing at its fummit one narrow, lanceolate, ftalked, fmooth, pale-green, ftraight leaf, fcarcely two inches long, and by its fide a flender, fhorter flower-ftalk, on which ftand two little pale bracteated *flowers*. It grows in Jamaica, from whence we have received it through Dr. Swartz's hands. 13. D. *fertularioides*. Sw. (Epidendrum fertularioides; Sw. Prod. 122) "Stem flender, creeping. Branches erect, very fhort, fingle-leaved. Leaves lanceolate, fomewhat ftalked. Flowers folitary." Sw. A native of Jamaica. 14. D. *racemiflorum*. Sw. (Epidendrum racemiflorum; Sw. Prod. 125.) Stem elongated, erect, fheathed. Leaf folitary, elliptical, ftalked. Clufter taller than the leaf. Flowers leaning to one fide, pointed, quadrangular. A native of Jamaica. Dr. Swartz. It has fomewhat of the afpect of the Linnæan *Ophrys monophyllos*, but with fewer flowers in the clufter, and thofe flowers are alfo larger. The *leaf* is obtufe, with one principal rib, and many fmaller ones. *Stem* invefted with a few long, tubular, brown, membranous fcales. 15. D. *alpeftre*. Sw. (Epidendrum alpeftre; Sw. Prod. 125.) "Stem elongated. Leaf folitary, ovato-lanceolate. Clufters loofe. Angles of the capfule muricated." Sw. A native of Hifpaniola. 16. D. *laxum*. Sw. (Epidendrum laxum; Sw. Prod. 125.) "Stem elongated. Leaf folitary, oblong, pointed. Clufters loofe. Capfules naked." Sw. A native of Jamaica. Dr. Swartz fufpects Plumier's Helleborine ophiogloffo fimilis, Ic. t. 176. f. 3, may be this fpecies, though quoted by Linnæus for his Epidendrum ophiogloffoides, which is Stelis ophiogloffoides of Swartz, a very different plant. 17. D. *rufcifolium*. Sw. (Epidendrum rufcifolium; Linn. Sp. Pl. 1353. Jacq. Amer. 226. t. 133. f. 3.) "Stem elongated. Leaf folitary, ovato-lanceolate. Flowers cluftered in the bofom of the leaf." Sw. Found in Martinico. *Root* fibrous. *Stem* folitary, fimple, ftraight, fcarcely a fpan high, bearing one pale terminal *leaf*, of an ovato-lanceolate, pointed form, with many ribs, from the infertion of whofe ftalk fprings a little tuft of greenifh white flowers.

*** Flowers reverfed.*

18. D. *biflorum*. Sw. (Epidendrum biflorum; Forft. Prod. 60.) "Stem round, fimple. Leaves in two ranks, linear-lanceolate, flat. Flower-ftalks very fhort, in pairs, oppofite to the leaves, proceeding from the bafe of their fheaths." Sw. Native of the Society iflands, in the South fea. The *ftem* bears many *leaves*, whofe fheaths are perforated by a pair of flower-ftalks, each bearing a fingle flower. Sw. 19. D. *anceps*. Sw. "Stem two-edged, fimple. Leaves in two ranks, lancet-fhaped, flat. Flower-ftalks very fhort, in pairs from the bafe of the fheaths." Sw. A native of the Eaft Indies, known to us only by the above characters. 20. D. *moniliforme*. Sw. (Epidendrum moniliforme; Linn. Sp. Pl. 1352. E. monile; Thunb. Jap. 30. Fu Ran; Kæmpf. Exot. 864, cum ic.) Stem round, fimple, jointed. Leaves linear-lanceolate, acute. Flowers on terminal, elongated, divaricated ftalks. Spur rounded. Common upon trees, rocks, and walls in Japan, where it is ufual to hang up bunches of this plant in the houfes, in which fituation it will, according to Kæmpfer, bear flowers and feed; and though it bloffoms no more, it will retain life for feveral years. The *roots* creep by means of fcyons. *Stems* cluftered, erect, fimple, of many ftriated joints. *Leaves* coming after the flowers, linear-lanceolate, acute, chiefly about the tops of fome of the ftems. *Flowers* from the fummits of the leaflefs ftems, two, three, or more, together, on fpreading ftalks about an inch long. They are white or blufh-coloured, with a thick rounded bafe or fpur. The lip is fpotted with purple. Kæmpf. Thunb. 21. D. *crumenatum*. Sw. (Angræcum crumenatum; Rumph. Amb. v. 6. 105. t. 47. f. 2.) "Stem fomewhat branched, flightly compreffed, tuberous at the bafe. Leaves ovato-lanceolate. Clufters erect. Flowers in alternate diftant pairs. Spur acute." Sw. Native of Java; Sw. Amboina; Rumphius. This fpecies is but imperfectly known to us, though we have feveral from Dr. Buchanan, and there are fome in Rumphius, nearly related to it, the precife determination of which muft be referved for fome future opportunity. Their *flowers* are generally large and handfome, often in pairs, with a confiderably elongated fpur like bafe. *Stems* clothed with alternate *leaves*, of a coriaceous texture whith numerous ribs. 22. D. *polyftachyon*. Sw. (Epidendrum minutum; Aubl. Guian. v. 2. 824. Heleborine ramofa, floribus minimis luteis; Plum. Ic. 180. t. 185. f. 1.) "Leaves nearly radical, elliptic-lanceolate. Stem two-edged. Spikes numerous, alternate, all leaning one way." Sw. Native of Guiana, the Weft Indies, and, according to Swartz, of Africa and the Eaft Indies. *Root* of many thick, juicy, fimple fibres. *Stem* folitary, clothed, at the very bafe only, with feveral broad-lanceolate, fpreading, rigid, ribbed *leaves*. *Flowers* terminating the ftem, which is otherwife fimple, in feveral alternate, loofe, roughifh fpikes. *Bracteas* minute. *Petals* fmall, yellowifh. *Germen* long. *Capfules* elliptical. The flowers in Plumier's plate are very incorrect. 23. D. *crifpatum*. Sw. (Epidendrum crifpatum; Forft. Prod. 60.) "Stem branched, wand-like. Leaves thread-fhaped, fomewhat incurved. Clufters lateral, fimple." Sw. Found in the Society ifles of the South fea. The middle fegment of the lip is revolute, undulated and crenate. Forfter. 24. D. *javanicum*. Sw. "Stem throwing out roots. Leaves ftalked, erect, broad-lanceolate, obtufe. Stalks many-flowered, from the bafe of the fheathing footftalks." Sw. A native of Java. 25. D. *fpeciofum*. Sm. Exot. Bot. v. 1. 17. t. 10. Stem fimple. Leaves nearly radical, elliptic-oblong. Clufter folitary, terminal, many-flowered. Lip three-lobed. Grows on rocks and trees about Port Jackfon, New South Wales. *Stem* fhort and thick. *Leaves* almoft entirely radical, from fix to twelve inches long, more or lefs recurved, oblong or fomewhat elliptical, ribbed, very tough and rigid. *Clufter* folitary, on a terminal, fcaly ftalk, fimple, a foot or more in length, confifting of a great number of alternate or fcattered flowers, which are large and handfome, variegated with white, yellow, and pink, the lip dotted wirh purple. *Capfule* obovate, large. 26. D. *linguiforme*. Sm. Exot. Bot. v. 1. 19. t. 11. Stem creeping. Leaves feffile, obo-

 vate

vate ſmooth, fleſhy. Cluſters from the baſe of the leaves. Lip revolute. Grows on rocks along the ſea-ſhore at Port-Jackſon, New South Wales. *Stems* branched, creeping, with very long, thick, fibrous roots. *Leaves* alternate, ſcarcely an inch long, ſeſſile, obovate or elliptical, ſmooth, extremely thick and juicy, convex beneath, furrowed above. *Stipula* ſolitary, ſheathing, membranous, very large. *Cluſters* ſolitary from each ſtipula at the baſe of the leaf, erect, about a finger's length, inveſted with a double ſheath of their own in the lower part, ſlender above, of ſix or more very elegant flowers. The *petals* and *calyx-leaves* are upright, linear, acute, cream-coloured. *Pouch* yellowiſh, ſhort. *Lip* narrow, acute, revolute, ſlightly three-lobed, blue near the baſe, yellowiſh and furrowed towards the extremity. 27. D. *pygmæum*. Stem creeeping, bulbiferous. Leaves nearly ſeſſile, elliptical, downy, coriaceous, ſolitary from each bulb. Cluſters . . . . Gathered on moſſy rocks and trees in New Zealand, by Mr. Archibald Menzies, F.L.S. This is but half the ſize of the laſt, with which it agrees ſo nearly in habit, that though its flowers are unknown, we ſcruple not to refer it hither. *Stems* thread-ſhaped, ſlender. *Leaves* alternate, on very ſhort footſtalks, elliptical, obtuſe, revolute, coriaceous rather than fleſhy; ribbed and roughiſh beneath; clothed above with ſhort, prominent, downy hairs. Each footſtalk proceeds from a little round bulb, like a ring, ſmooth and ſhining, yellowiſh, and much wrinkled in a dry ſtate, but apparently very ſucculent when freſh. 28. D. *reptans*. Sw. "Stem creeping, bulbiferous. Leaves ovate, in pairs from each bulb. Flower-ſtalks radical." Sw. Found in the iſland of Mauritius. Of this we know nothing but the above character of Dr. Swartz, who quotes in Schrader's Journal, 215, (where he originally made it a *Cymbidium*,) the Tjſeroutecka-maravara, Rheede Hort. Mal. v. 12. 45. t. 23, but with a mark of doubt. The plant there figured is cloſely allied to our laſt ſpecies, but its leaves are larger, ſmooth, emarginate, and their bulbs rather elliptical than annular. Each bulb bears but one leaf, which circumſtance does not accord with Dr. Swartz's ſpecific character. 29. D. *galeatum*. Sw. "Stem creeping. Branches ſheathed, ſingle-leaved. Leaves broad-lanceolate, obtuſe. Cluſters ſolitary, many-flowered, ſhorter than the leaves. Flowers conical, incurved, helmet-ſhaped." Sw. Gathered at Sierra Leone, Africa, by Dr. Adam Afzelius, as well as the three following, all known to us merely by the characters given in Dr. Swartz's work above quoted. 30. D. *pumilum*. "Stem creeping, thread-ſhaped, bulbiferous. Leaves oblong, ſolitary from each bulb. Flower-ſtalks from the baſe of the bulbs, very ſlender, elongated; zig-zag at their ſummits." Sw. 31. D. *roſeum*. "Stem leafleſs, upright, clothed with ovato-lanceolate membranous ſheaths. Cluſter terminal. Flowers conical, ſomewhat deltoid; lip ſpatulate, minutely crenate." Sw. 32. D. *paniculatum*. "Stem clothed in its lower part with oblong, obtuſe, emarginate leaves; in its upper two-edged and ſheathed. Spikelets thread-ſhaped, panicled, terminal. Flowers crowded, minute." Sw.

Dr. Swartz conjectures the *Epidendrum carinatum*, Linn. (Bontiana luzonica; Petiv. Gazoph. t. 44. f. 10.) may be of this genus, which, as far as can be gueſſed from Petiver's incomplete figure, is probable. Linnæus, who truſted to this figure alone, ſeems to have taken the bulbs for leaves.

Alſo the following:

Epidendrum graminifolium; Linn. known only by Plumier's Ic. t. 176. f. 1.

Epidendrum concretum; Jacq. Amer. 228.

Ceraia ſimpliciſſima; Loureir. Cochinch. 518.

Flos lyncis; Hernand. Mex. 266, a magnificent plant apparently moſt akin to our ſecond ſpecies.

The whole genus *Maxillaria* of the Flora Peruviana. See its Prodromus, t. 25.

With ſeveral ſpecies of *Angræcum* in Rumphius, to which we have already alluded; ſee his v. 6. t. 45—51.

DENDROMETER, (from δενδρον, *a tree*, and μετρεω, *I meaſure*,) an inſtrument for meaſuring trees. The firſt inſtrument for the purpoſe of meaſuring the trunk, the branches, and the height of a tree, without actually touching the tree, was contrived, not many years ago, by Meſſrs. Duncombe and Whittel, who called it the *dendrometer*, and obtained a patent for the excluſive ſale of it. Since this inſtrument ſerves to meaſure trees from a determinate diſtance, other inſtruments, contrived ſubſequent to it, for the purpoſe of meaſuring the ſizes as well as the diſtances of objects in general, though not particularly intended for the menſuration of trees, have likewiſe been called *dendrometers*. The principle of every one of thoſe inſtruments is, that a part of the inſtrument forms a baſe of known dimenſions, and the angle at each extremity of this baſe being meaſured with great accuracy, the diſtance of the object may be obtained by means of an eaſy calculation, or from a table. The diſtance being thus aſcertained, the ſize of the object will afterwards be eaſily determined from the angle which it is found to ſubtend. We ſhall now in the firſt place deſcribe Meſſrs. Duncombe and Whittel's original dendrometer; ſecondly, we ſhall deſcribe another inſtrument lately contrived for the purpoſe of meaſuring trees but by immediate contact; and ſhall, laſtly, give a general idea of the other inſtruments for meaſuring diſtances, &c. which have likewiſe obtained the name of *dendrometers*.

"Meſſrs. Duncombe and Whittel's dendrometer conſiſts of a ſemicircle A, (*Plate* VI. *Surveying*, *fig.* 7.) divided into two quadrants, and graduated from the middle. Upon the diameter B, there hangs a plummet, L, for fixing the inſtrument in a vertical poſition. There is alſo a chord, D, parallel to the diameter, and a radius, E, paſſing at right angles through the diameter and chord. From a point on the radius, hangs an altimeter C, between the chord and diameter, to which is affixed a ſmall ſemicircle G, and a ſcrew to confine it in any poſition. The altimeter, which is contrived to form the ſame angle with the radius of the inſtrument as the tree forms with the horizon, is divided from its centre both ways into 40 equal parts; and theſe parts are again ſubdivided into halves and quarters. Upon the ſmall ſemicircle, G, on which is accounted the quantity of the angle made by the altimeter and radius, are expreſſed degrees from 60 to 120; being 30 on each quadrant. The radius is numbered with the ſame ſcale of diviſions as the altimeter. There is alſo a nonius to the ſmall ſemicircle, which ſhews the quantity of an angle to every five minutes. On the back of this inſtrument the ſtock M, (*fig.* 8.) of the ſliding piece is confined to the axis N, which moves concentrically parallel to the elevation index, F, (*fig.* 7.) on the oppoſite ſide, to which it is affixed. This index is numbered by a ſcale of equal diviſions with the altimeter and radius. At the end of the index is a nonius, by which the angles of elevation above or of depreſſion below the horizon, meaſured upon the ſemicircle of the inſtrument, are determined to every five minutes. There is alſo a groove in the radius, that ſlides acroſs the axis by means of a ſcrew, I, working between the chord and ſemicircle of the inſtrument; and this ſcrew is turned by the key O. Upon the ſtock, M, (*fig.* 8.) is a ſliding piece, P, that always acts at right-angles with the altimeter, by means of a groove in the latter. To the ſhank of the ſliding piece is affixed a moveable limb, Q, which forms

forms the fame angle with the altimeter as the bough forms with the body, or trunk, of the tree. This limb may be of any convenient length, divided into equal parts of the fame fcale with all the foregoing divifions."

" At the extremity of the fixed axis, on a centre, an index, R, with telefcopic fights, works horizontally upon the moveable limb of the fliding piece. Upon this horizontal index, R, may be fixed a fmall quadrant, T, defcribed with any convenient radius from the centre, on which the index moves, and divided into 90°; beginning at a right line drawn from the centre at right angles with the fiducial edge of the faid index; and upon the extremity of the axis is a nonius, whereby to determine the quantity of an angle upon the quadrant to every five minutes. There are alfo two fmall circular arches, S, S, ferving to keep the fights in a parallel pofition, each containing an equal number of degrees. Upon thefe arches is meafured the angle, fubtending a fide equal to the difference of the altitudes of the obferved objects, above the plane of the horizon, and whofe bafe is the neareft diftance between the perpendiculars, in which thofe objects are fituated. The *dendrometer* is fitted to a theodolite, and may be ufed either with or without it, as occafion requires."

" The principal ufe of this inftrument is for meafuring the length and diameter of any tree, perpendicular, or oblique, to an horizontal plane, or in any fituation of the plane on which it refts, or of any figure, whether regular or irregular, and alfo the length and diameter of the boughs, by mere infpection; and the inventors of it have calculated tables, annexed to their account of the inftrument itfelf, by the help of which the quantity of timber in any tree is obtained without calculation, or the ufe of the fliding rule.

" The inftrument is rectified by fetting it in a perpendicular pofition, by means of the plummet, and fcrewing it to the ftaff; then the altimeter is placed in the exact pofition of the tree, whether perpendicular, reclining, or inclining, and is fcrewed faft. If the tree ftands on level ground, the horizontal diftance from the tree to the axis of the inftrument is meafured with a tape line, and the radius is moved with the key, till that diftance be cut upon it by the infide of the diameter: but if the ground be flanting, the diftance from the tree to the inftrument is meafured, and the elevation index is moved, till the point of the tree, from which the diftance was meafured, is feen through the fights, and there fcrewed faft; and the radius is moved backwards or forwards with the key, till this diftance is cut upon the elevation index by the perpendicular line of the altimeter; and the horizontal line will be marked upon the radius by the infide of the diameter. In order to obtain the length of the tree, the elevation index is firft moved downwards, till the bottom of the tree, cut by the horizontal wires, is obferved through the fights, and the feet and inches marked by the index upon the altimeter below the point of fight, or horizontal line, are noted down: then the index is moved upwards, till the part which you would meafure, cut by the horizontal wires, is feen, and the feet and inches marked on the altimeter, above the point of fight, are noted: thefe two quantities added together, give the exact length of the tree, which is inferted in a field-book. For the girth of the tree, the circumference in that part where the horizontal diftance was taken, is meafured with the tape line; and a fixth part of this circumference is added to the diftance on the radius, which was before cut by the infide of the diameter, becaufe the tape-line, in taking the diftance, cannot be applied to the centre of the body of the tree; then the elevation index is lowered to that part of the tree, of which the diameter is to be taken, and is fcrewed faft. Set the moveable limb of the fliding-piece quite ftraight, and the edge of the horizontal index upon the firft divifion of it. Turn the whole inftrument about to the left hand, till you fee, through the fights, the left fide of the tree cut exactly by the perpendicular wires; then the inftrument being fixed, move the fights only upon the fliding-piece, till you fee the right fide of the tree, cut alfo by the perpendicular wires, and you will find the true diameter, marked by the horizontal index upon the fliding-piece, which is to be entered in a diftinct column of the field-book.

" For the boughs: let the diftance on the radius be now reduced to its former quantity, and the elevation index moved upwards, till the bough is feen through the fights, and fcrewed faft. Set the moveable part of the fliding piece in a pofition parallel to the bough, and the edge of the horizontal index on the firft divifion of it. Turn the whole inftrument about, till you fee, through the fights, the fhoot of the bough, clofe to the trunk cut by the perpendicular wires; then move the fights, till you fee the other end of the bough cut by the faid wires, and note the feet and inches marked by the horizontal index on the moveable limb of the fliding piece, which will give the true length of the bough to be inferted in the field-book. And the girth of the bough may be obtained, by directing the fights to that part of it, whofe girth is defired; then by moving the elevation index downwards, till you fee the under-fide of the bough cut by the horizontal wires, and there noting the feet and inches marked by the faid index on the altimeter; after which let the elevation index be moved upwards, till the upper fide of the bough, cut by the horizontal wires, is feen; the feet and inches marked upon the altimeter are to be noted as before: the former quantity fubtracted from the latter, will give the true diameter of the bough, which is entered in the field-book. The true folidity, both of the body of the tree, and of the boughs, may be found from the diameter and lengths, in tables calculated for this purpofe.

" The dendrometer, fitted to a theodolite, may be applied to the meafuring of heights and diftances of objects acceffible or inacceffible, whether fituated in planes parallel, or oblique, to the plane in which the inftrument is placed. It may be alfo ufed for taking all angles, whether vertical, horizontal, or oblique, in any pofition of the planes in which they are formed; and thus for facilitating the practical operations of engineering, land-furveying, levelling, mining, &c. and for performing the various cafes of plane trigonometry, without calculation; of which the inventors have fubjoined a variety of examples to their account of the inftrument in their treatife upon the *Dendrometer*."

Notwithftanding the oftenfible extenfive application of this inftrument, it does not appear that the ufe of it has been generally adopted, which may be principally attributed to its complicated conftruction.

The 25th volume of the Tranfactions of the Society for the encouragement of Arts, Manufactures, and Commerce, contains a very ufeful and fimple machine for the meafurement of the girths of trees, to which the inventor, Mr. James Broad, gives the name of *Gauge*, or *Meafure for Timber*, but which in fact is a dendrometer in the ftrict fenfe of the word, and it therefore deferves a place in the prefent article. This inftrument is reprefented in *Plate* III. *Surveying*, *fig*. 9. *a a*, *a a*, Mr. Broad fays, are two long pieces of well-feafoned wood, joined near the middle by a pin, *b*, going through them, forming an axis on which they move: *c*, *c*, are two pieces of brafs fcrewed near the upper ends, on the fides oppofite to each other, and projecting over to form the meafuring points: *d*, is the index faftened to one of the pieces of wood at *e*, and moving freely under a fmall bar at *f*: *g*, *g*,

g, g, are ſcrews with nuts, placed in the middle of the long ſlits of the two arms, to wedge them open, whereby the vibration is deſtroyed, and the arms, though light, are rendered ſtiff: *h, h, h, h*, are ſcrews and nuts, to prevent the arms from ſplitting. With reſpect to the general conſtruction, uſe, and improvements that may be made to it, Mr. Broad expreſſes himſelf in the following manner.

" The inſtrument is compoſed of two ſtraight pieces of well-ſeaſoned deal, about 13 feet long, joined together by a pin going through them, on which they are moveable; but neither the length nor thickneſs is of any particular conſequence, as by following the directions hereafter given, they may be made of any ſize. A little way from the large end is a braſs limb, I call the index, on which are engraven figures denoting the quarter-girth in feet and inches. To uſe this inſtrument, it is only neceſſary to take hold of the large end, and apply the other to that part of the tree where you wiſh to know the girth, opening it ſo wide as juſt to touch at the ſame time both ſides of it, without ſtraining it, keeping the graduated ſide of the index uppermoſt, on which the greater girth will be ſhewn, after allowing for the bark, by the inner edge of the braſs on the right-hand leg. An operation ſo eaſy and ſimple, that a perſon of the meaneſt capacity might meaſure a great number of trees in a day.

" For taking the height of a tree, I would recommend deal rods of ſeven feet long, made ſo as to fit into ferrils at the end of each other, tapering all the way in the ſame manner as a fiſhing-rod. A ſet of five of them with feet marked on them, would enable a man quickly to meaſure a tree of more than 40 feet high, as he would be able to reach himſelf about ſeven feet.

" The improvements it is capable of, are, making a joint in the arch or ſcale, to enable it to ſhut up, (when the legs are cloſed) towards the centre, which would make it eaſier to carry. Secondly, as it ſometimes happens that ſtanding timber is ſold without any allowance for bark, and at other times with a leſs allowance than one inch in 13, two other ſcales on the index might be added in ſuch caſes, one without any allowance, and the other to allow as might be agreed on. I would have added theſe, but thought the ſociety would rather ſee it in the ſtate in which it has been tried on a large ſurvey, as any artiſt can with great eaſe add whatever ſcale he pleaſes. The preſent ſcale allows one inch in 13 for bark, and is calculated on the following data. The diameter of a circle, whoſe quarter-circumference is 26 inches, is 33.96 inches. The diameter of a circle, whoſe quarter-girth is $6\frac{1}{2}$ inches, is 8.27 inches. To graduate the ſcale, the inſtrument is opened ſo as to take in at the ſmall end between the touching points 8.27 inches, and a mark is made on the arch to denote 6 inches quarter-girth; it is then opened ſo as to take in 33.96 inches, and another mark is then made on the arch, to denote 2 feet quarter-girth; (theſe marks are made cloſe to the inner edge of the braſs on the right-hand limb:) the ſpace between them is then divided into 18 parts, which repreſent inches, and are again divided into halves, for half-inches; if any notice is to be taken of quarter-inches, the eye will eaſily make a farther deciſion."

The methods of determining the diſtances and ſizes of objects placed at a diſtance from the obſerver, depend entirely upon trigonometrical principles; and thoſe methods for effecting that purpoſe, which ſeem to differ from trigonometrical principles, will upon examination be found to be nothing more than trigonometrical methods abridged or diſguiſed. The general principle upon which all the operations of plane trigonometry depend, is to find out three of the ſix parts of a triangle, when the other three are known; (the ſix parts being the three ſides and the three angles;) excepting, however, when the three angles are given; for in this caſe the proportion only of the three ſides may be found; but not their actual lengths.

When an inacceſſible diſtance is to be determined by trigonometry, the method is to meaſure a line or baſe upon any convenient place, and to obſerve the angles which the imaginary lines, ſuppoſed to be drawn from the extremities of that baſe line to a point or object at the extremity of the diſtance ſought, make with the baſe; for in that caſe we have two angles, and one ſide of a triangle, whence we find by calculation the lengths of the other ſides, one of which is the diſtance ſought. If an object of any known dimenſions be ſituated at the extremity of the diſtance ſought, that diſtance may then be determined without the neceſſity of aſſuming a baſe line upon the place of obſervation; for in that caſe, the object itſelf will be ſuppoſed to form the baſe of an iſoſceles, or of a right-angled triangle; and it will be only neceſſary to meaſure the angle which that object ſubtends at the place of obſervation. The diſtance of an object being known, the ſize of the object may be eaſily determined by only meaſuring the angle which it ſubtends. See Trigonometry.

Now the dendrometers for meaſuring diſtances from a ſingle ſtation, are ſo conſtructed as to have a line of a determinate length within themſelves, which ſerves as a baſe line, and two divided circular arches, or ſome other contrivance by which the angle which the direction of a diſtant object makes with that baſe line at each extremity of it, may be meaſured. But as ſuch inſtruments cannot be made of an inconvenient large ſize, the baſe line which they contain is but ſhort, and the error of the calculation is greater when the baſe line is ſhorter, and *vice verſâ*; whence ſuch inſtruments ſeldom furniſh a reſult ſufficiently exact, at leaſt for certain purpoſes.

The moſt complete inſtruments of this kind are furniſhed with two or more ſpeculums, (ſomewhat in the manner of Hadley's quadrant,) for meaſuring the difference of the angles at once. Upon this plan ſeveral inſtruments have been contrived and offered to the public by various writers. One of the moſt promiſing, though not the moſt compact, is deſcribed in "Gower's Supplement to the Practical Seamanſhip." But as we are not acquainted with the conſtruction of any inſtrument of this kind, that is quite free from ſtrong objections, we ſhall only ſubjoin a general idea of the principles upon which ſuch an inſtrument may be conſtructed; for the uſe of thoſe perſons who may be deſirous of employing their thoughts upon the poſſible improvements of that conſtruction.

The following plans are ſuggeſted by William Pitt, eſq. in the ſecond volume of the Repertory of Arts; which, he ſays, may perhaps be otherwiſe varied and improved.

" O, (*fig.* 10.) is the object, whoſe diſtance is required. A B C D E is the inſtrument *in plano*; B C a teleſcope placed exactly parallel to the ſide A E. C E an arch of a circle whoſe centre is at A, accurately divided from E, in degrees, &c. A D is an index, moveable on the centre A, with a nonius at the end D, graduated to apply to the diviſions of the arch; alſo with a teleſcope, to enable the obſerver to diſcriminate the object, or any particular part, or ſide, thereof, the more accurately. The whole ſhould be mounted on three legs in the manner of a plane-table or theodolite, and furniſhed with ſpirit levels, to adjuſt it to an horizontal poſition. The inſtrument being placed in ſuch poſition, the teleſcope B C muſt be brought upon the object O, or rather upon ſome particular point or ſide thereof;

when

when, being there faftened, the index A D muft be moved, till its telefcope exactly ftrikes the fame point of the object; then the divifions on the arch E D, mark out the angle D A E, which will be exactly equal to the angle B O A. And the fide B A being already known, the diftance B O, or A O, may be eafily determined two different ways; *viz.* 1ft, by fuppofing the triangle B O A to be an ifofceles triangle; or, 2dly, by fuppofing the triangle A B O right-angled at B. The accuracy of fuch an inftrument does, *cæteris paribus*, much depend upon the length of the line A B.

"The conftruction of a fimilar inftrument, on the principles of Hadley's quadrant, for naval obfervations, would alfo doubtlefs be an acceptable object in navigation, by enabling the mariner to afcertain the diftances of fhips, capes, and other objects, at a fingle obfervation; and that perhaps with greater accuracy than can be done by any method now in ufe.

"For this purpofe, the following conftruction is propofed. A B C D, (*fig.* 11.) reprefents the inftrument *in plano*. O is the object whofe diftance is required. At A, at C, at D, and at 3, are to be fixed fpeculums, properly framed and fitted; that at 3 having only its lower part quickfilvered, the upper part being left tranfparent, to view the object; the fpeculum at A being fixed obliquely, fo that a line A 1, drawn perpendicular to its furface, may bifect the angle B A C in equal parts; that at C being perpendicular to the line C 2; thofe at E, and at 3, being perpendicular to the index E 3; and that at E being furnifhed with a fight. The arch D C is to be divided from D, and the motion of the index is to be meafured as before by a nonius. And as the length of the line A E would tend to the perfection of the inftrument, it may be conftructed fo as to fold up in the middle, on the line C 2, into lefs compafs when not in ufe. The inftrument may be adjufted for ufe, by holding up a ftaff at a diftance, whofe length is exactly equal to the line A E.

"To make an obfervation by this inftrument, it being previoufly properly adjufted, the eye is to be applied at the fight in the fpeculum E, and the face turned towards the object; when the object being received on the fpeculum A, is reflected into that at C, and again into that at E, and that at 3 on the index; the index being then moved till the reflected object, in the fpeculum at 3, exactly coincides with the real object in the tranfparent part of the glafs. Then the divifions on the arch D3, fubdivided by the nonius, will meafure the angle D E 3 = A O E; from which the diftance of O may be determined as before."

When a ftraight line of at leaft 10 or 20 feet, may be meafured at the ftation, where the obferver is fituated, and in the direction of a diftant object; the fize and diftance of that object may be determined by the ufe of a moft fimple inftrument; namely, a telefcope furnifhed with a micrometer, and thus trees and other objects may be meafured in a manner extremely commodious and fufficiently accurate. The problems neceffary for this purpofe, as given by Mr. Cavallo in the defcription of his "Telefcopical Mother-of-Pearl Micrometer," will be found under the article MICROMETER.

DENDROPHORIA, formed of δενδρον, *tree*, and φερω, I *bear*, in *Antiquity*, the carrying of one or more trees, in ceremony, through a city, at certain feafts, and in honour of certain deities.

The dendrophoria was performed at the facrifices of Bacchus, Cybele, and the god Sylvanus. Arnobius, lib. v. makes mention of that performed in the facrifices of the mother of the gods. It confifted in carrying a pine in proceffion through the city; which pine was afterwards planted in memory of that under which Atys, the favourite of this goddefs, mutilated himfelf. The branches of this tree they crowned, in memory of Cybele's doing the fame; and they covered its trunk with wool, becaufe the goddefs covered Atys's breaft with the fame matter.

The perfons who performed the office of carrying the tree were called dendrophori.

In the Roman hiftory we find mention made of a company or college of dendrophori, who attended the army; and the critics have laboured much to affign their office. Some hold, that they hewed and fafhioned the wood for the tents: others, that they provided the wood neceffary for the military works, machines of war, &c. Salmafius, in his notes to the life of Caracalla by Spartian, owns this to be the general opinion of all the learned men of his time; but affures us, that they were all miftaken, and that the dendrophori of the army were the fame with thofe of the feafts and facrifices.

DENEB, an Arabic term, fignifying tail; ufed by aftronomers as a denomination of feveral fixed ftars.

Thus deneb elecet fignifies the bright ftar in the Lion's tail; deneb adigege, that in the Swan's tail, &c.

DENEB, or ALDENEB, *Alcahil*, in the *Writings of the Arabian Phyficians*, the name of the equifetum or horfe-tail; there is, however, no great dependence to be had on what authors fay of this plant.

DENE'E, in *Geography*, a fmall town of France, in the department of Maine and Loire; 9 miles S. of Angers.

DENEITER, a town of America, in the ftate of New York, and county of Chenango, containing 310 inhabitants.

DENEUVRE, a fmall town of France, in the department of the Meurthe; 3 miles S.E. of Baccarat, and 12 miles S.E. of Luneville. It is fituated on the river Meurthe.

DENEZ'E, a town of France, in the department of the Maine and Loire; 8 miles W. of Saumur.

DENFIELD, a town of America, in New York, and county of Oneida, containing 1039 inhabitants.

DENGLING, a town of Germany, in the circle of Bavaria, and archbifhopric of Saltzburg; 20 miles N.W. of Saltzburg.

DENGUIN, a fmall town of France, in the department of the Lower Pyrenées; 3 miles W. of Lefcar.

DENHAM, Sir JOHN, in *Biography*, a poet who has obtained celebrity, chiefly, if not entirely, on account of a few happy couplets that have been quoted a thoufand times as illuftrative of high poetic excellence. He was born at Dublin in 1615; his father, fir John, being at the time of the fon's birth, chief baron of the exchequer in Ireland; an office which he did not long enjoy, as he returned to England in 1617. The young man having laid the foundation of a learned education at a grammar-fchool, was, at the age of fixteen, entered a gentleman commoner in Trinity college, Oxford. As a ftudent he did not by any means diftinguifh himfelf, but neverthelefs obtained his bachelor's degree, and removed to Lincoln's-Inn to ftudy the law. At college he had acquired an unfortunate propenfity for gaming, which in London rather increafed than diminifhed. In theory he felt as much as any man the folly and guilt of the practice, and wrote an effay on the fubject, expofing its enormity, but he was ftill a practical gamefter, and, after the death of his father, loft much of the property that had devolved to him by the folemn event. In the year 1641 he commenced his literary career, and brought out a tragedy, entitled "The Sophy," which, though now forgotten, was well received on the ftage, and admired in the clofet. As a political

cal character he adhered to the king's party, and was appointed, soon after the breaking out of the civil wars, governor of Farnham castle; an honour which he soon resigned, his mind being ill-adapted to a military life. He still remained with the court, and performed some signal services for the king, during his calamities. It does not appear how the poet was employed, or supported, during the interval between the execution of Charles I. and the restoration of his successor. It was, however, very early in the civil broils of the nation, that he published his poem, entitled "Cooper's Hill," which very soon underwent several considerable editions, and which is still read and referred to, on account of some excellent and highly expressive lines, and also because it is one of the earliest examples of local description united with historical and sentimental matter. The lines which have excited the most attention are part of a description of the river Thames:

O could I flow like thee, and make thy stream,
My great example—as it is my theme!
Tho' deep, yet clear; tho' gentle, yet not dull;
Strong without rage: without o'erflowing, full.

Of these lines Dr. Johnson says: "But so much meaning is confined in so few words; the particulars of resemblance are so perspicaciously collected, and every mode of excellence separated from its adjacent fault, by so nice a line of limitation; the different parts of the sentence are so accurately adjusted, and the flow of the last couplet is so smooth and sweet, that the passage, however celebrated, has not been praised above its merit. It has beauty peculiar to itself, and must be numbered among those felicities which cannot be produced at will by wit and labour, but must rise unexpectedly in some hour propitious to poetry." Much has been written by way of accounting for the beauty of these lines: Mr. Mason, in his Essay on the Power of Numbers and Principles of Harmony, after a critique of some length, says, "the beauty of this distich consists in two things, *viz.* the elegance of the style, and the harmony of the verse. The elegance of the style arises from the transposition of the words, the propriety of the pauses, and the contrasts of the description: and the harmony of the verse arises from the variety and disposition of the numbers happily adapted to the emphasis of the words, and the nature of the subject."

To return however to the author; soon after the restoration he obtained the office of surveyor of the king's buildings, in the room of Inigo Jones, and was created knight of the bath, and a member of the royal society. Amidst these honours, accompanied with some emoluments, he was doomed to much disquietude from a second marriage, which terminated in a temporary insanity, from which however he recovered, and continued highly esteemed by the great and the wise till his death, which happened in the spring of 1668. His remains were deposited in Westminster Abbey. Biog. Brit. Johnson's Poets.

DENIA, in Latin *Dianium*, from Diana, in whose honour it was built by a colony from Marseilles some centuries before the Christian era, is a town of Spain, in the province of Valencia, on the declivity of a mountain, stretching towards the sea; 63 miles N. by E. of Alicante, 54 miles S.E. of Valencia, opposite the island of Ivica, containing 1500 inhabitants. N. lat. 38° 56′. It has a strong castle, and a convenient harbour, and is remarkable for a tower of great height, from whence vessels are perceived at a great distance at sea. The Moorish kings resided here from A.D. 1015 to 1244.

DENIER, in *Coinage*, the French penny; a small copper coin, twelve whereof make a sol, or French shilling.

The French denier is now about the twenty-third part of the English penny. It is subdivided into two mailles, and the maille into two oboles. Anciently denier was a general name for all sorts of monies in France; as nummus for those of Rome. Thus, a piece of gold money was called denier d'or, silver money, denier d'argent: after the same manner as the Romans said nummus aureus, and nummus argenteus.

There are two kinds of deniers; the one Tournois, the other Parisis; whereof the latter was worth a fourth part more than the former, and was called monnoy royale, or forte monnoye, and sometimes denier d'or, and denier à valeur d'or. See MONEY, &c.

There are at present in France several little copper pieces, which, having no proper name, are distinguished only by their value in deniers; such are the pieces of 36. 30. 24. 18. 12. 6. 4. and 2 deniers. The pieces of 4 and 2 deniers were coined at Strasburg for currency in their province of Alsace, pursuant to the declaration of Sept. 6, 1695. Those of six deniers were coined in the mints of Aix, Montpelier, Rochelle, Bourdeaux, and Nantz, by the edict of 1709, and are little current. Post. Dict. Comm.

DENIS, ST., in *Geography*. See ST. DENYS.

DENIS, *St.*, the chief town of the isle of Reunion, formerly called Bourbon; and the residence of the governor of the colony. The abbé de la Caille has, by astronomical observations, ascertained the situation of the town in 20° 51′ S. lat., and 53° 10′ E. long. from the meridian of Paris.

DENIZEN, from the British *dinasddyn*, man of the city, or *dinesydd*, free of the city, in *Law*, an alien enfranchised in England by the king's letters-patent, and donation; and thereby enabled, in many respects, to do as the king's native subjects do: namely, to purchase, possess, and devise lands, &c.

Denizenship is a right inferior to naturalization by parliament: for a stranger naturalized may inherit lands by descent which a denizen cannot. A denizen is in a kind of middle state between an alien and a natural born subject, and partakes of both of them. He may take lands by purchase or devise, which an alien may not; but cannot take by inheritance; (11 Rep. 67.) for his parent, through whom he must claim, being an alien, had no inheritable blood, and therefore, could convey none to the son. And, upon a like defect of hereditary blood, the issue of a denizen, born *before* denization, cannot inherit to him; but his issue born *after*, may. (Co. Litt. c. 8. 8 Vaugh. 285.) A denizen is not excused from paying the alien's duty, (stat. 22 Hen VIII.) and some other mercantile burthens. No denizen can be of the privy council, or either house of parliament, or have any office of trust civil or military, or be capable of any grant of lands, &c. from the crown. (Stat. 12 Will. III. cap. 2.) See ALIEN.

Add, that, in the charter, whereby a person is made a denizen, there is usually some clause or other, which abridges him of that full benefit which natural subjects enjoy.

When a man is thus enfranchised, he is said to be *ad fidem regis Angliæ*; or under the king's protection; till such time his goods might be seized to the king's use.

DENMARK, in *Geography*, in Latin *Dania*, in German *Dänemark*, one of the most ancient monarchies of modern Europe; comprises 1. Denmark Proper, or the peninsula of Jutland, the southern part of which is called the duchy of Sleswick; with several islands in the Baltic, the principal of which are Zealand, Funen, Laaland, Langeland and Falster. 2. The duchy of Holstein in Germany. 3. The kingdom of Norway with Finmark and part of Lapland. 4. Iceland. 5. The Faro or Ferro islands. 6. Greenland. 7. The islands

iſlands of St. Thomas, St. Croix, and St. John, in the Weſt Indies, which at this time, 1808, however, are in the poſſeſſion of the Engliſh. And, 8. The eſtabliſhment of Tranquebar, on the coaſt of Coromandel, in the Eaſt Indies, which has ſhared the ſame fate.

Denmark Proper is ſituated between 54° 20′, and 58° 40′ north latitude, and 8° 10′, and 12° 40′ eaſt longitude. It is that part of the Scandinavia of the ancients which they called Cherſoneſus Cimbrica. Its name ſeems to be derived from the ancient Teutonic words *dane* or *thane*, a prince or lord, and *mark*, a boundary or frontier country, correſponding in ſome degree with the German *marggrafſchaft*, a frontier country, confided to the protection of an earl. Saxo Grammaticus, however, is of opinion that Denmark ſignifies the country of Dan, who is ſuppoſed to have lived 1038 years before the Chriſtian era, and to have raiſed himſelf to the throne by his courage and ſkill in war. But it is uncertain whether any ſuch king ever exiſted, unleſs it be Dan Mikillati, or the Haughty, mentioned by the hiſtorians of Iceland as having reigned in the year of Chriſt 146. Others pretend that the river Eyder, which ſeparates Denmark from Germany, was anciently called Don, Dana, or Dena, and that all the country now called Jutland was from that river named Dania, or Denmark, which appellation was alſo applied to the conquered iſlands. The name of Denmark may perhaps be traced in the old Britiſh word *Dan*, a ſtrong fortification.

Nearly at the time when Rome paſſed under the authority of emperors, that part of the north of Europe, known to the Romans by the name of Scandinavia, was invaded by a fierce people emigrated from the banks of Boryſthenes and the Tanaïs. The natives adopted the language, religion, and manners of their conquerors. With them they formed a nation that acted a conſpicuous part in the revolution which altered the political exiſtence of Europe after the fall of the Roman empire. Three diſtinct ſtates aroſe by degrees, Denmark, Sweden, and Norway; yet the uncertainty of their limits created frequent and bloody contentions. At the death of Rolf Krake, who is ſuppoſed to have reigned in the ſixth century, ſeveral tributary chiefs ſhared Denmark among themſelves and formed ſmall independent kingdoms; but new diſſenſions aroſe, and at length the three kingdoms of Denmark, Sweden, and Norway united under one chief, formed a powerful monarchy under the deſcendants of the firſt kings of Denmark. The ancient annals of the north extol the exploits of Ragnar Lodbroek, the laſt of thoſe powerful princes. In his attempt to invade England he was made a priſoner and put to death. His ſons divided his extenſive dominions among themſelves. Denmark again acknowledged a ſeparate king.

Powerful rivals, however, ſtarted up in ſome provinces; it was but in the tenth century that they were ſubdued. Schonen, Halland, and Blekingen, three Swediſh provinces ſituated on the other ſide of the Sound, were ceded by Emund, king of Sweden, to Swein. This king conquered all Norway and a conſiderable part of England; the complete conqueſt of which was achieved by his ſon Knut, or Canute the Great. But Magnus, a deſcendant from the kings of Norway, reconquered that kingdom in 1036, and England ſhook off the Daniſh yoke at the death of Hardeknut, or Hardy Canute, one of the ſons of Canute the Great, after whom the Daniſh crown paſſed in 1076 to his ſiſter's ſon, Swein Eſbrithſon. The latter began a dynaſty which held the ſceptre of Denmark for nearly four hundred years.

In the twelfth century Waldemar I. waged war againſt the Vandals who occupied the greateſt part of northern Germany. He took the iſland of Rugen, the town of Stettin, and ſeveral other places in Pomerania. In 1165 he is ſaid to have laid the foundations of Dantzic. In 1169 he ſubdued Courland, and eaſily maintained his authority in his new poſſeſſions, the emperor Frederick Barbaroſſa being favourable to his ſchemes of aggrandizement. He died in 1180. In the year 1195 his ſon Canute cauſed a muſter to be made of all the men fit to bear arms in his dominions, and ordered each province to fit out its proportion of ſhipping, when the whole naval force of Denmark was found to conſiſt of 670 ſhips. Aſſiſted by his brother, and by Abſalom biſhop of Roſchild, he made the conqueſt of part of Holſtein and of the cities of Hamburgh and Lubeck. Both the duke of Pomerania and the prince of Mecklenburg acknowledged themſelves his vaſſals. He died in 1202, and left the throne to his brother Waldemar II., a no leſs ambitious and warlike prince.

After having obtained from the emperor of Germany the ſanction of his claims on the countries conquered from the empire during the two preceding reigns, Waldemar II. ſet ſail for Eſthonia to convert the idolatrous inhabitants of that coaſt of the Baltic to Chriſtianity. But diſmayed at the unuſual ſight of numerous hordes of ſavages, clothed in ſkins, ready to oppoſe them, his troops were going to fly; when, encouraged by the biſhops who attended the king, they ruſhed on the enemy. The report of a banner having been ſent from heaven rallied the fugitives, and led them on to victory. This banner, which was religiouſly kept as a precious relic, under the name of Danebrog, became the oriflame or ſacred ſtandard of Denmark. The vanquiſhed Eſthonians acknowledged the God of the Chriſtians, and ſubmitted to Waldemar, whoſe powerful ſway was extended to both the ſouthern and eaſtern coaſts of the Baltic.

From an account copied by Pontanus from Wilfeld, who aſſerts that he had it from a regiſter kept by Waldemar's ſteward, it appears that the tributary provinces ſent in daily 24 laſts of oats, 24 laſts of rye, half that quantity of wheat, 13 talents of butter and cheeſe, and nine of honey, 24 oxen, 300 ſheep, 200 hogs, and 600 marks of coined money, beſides fines, forfeitures, taxes on law ſuits and pleadings, and other contingencies, amounting in all to upwards of 100,000 marks a-day. With this almoſt incredible revenue, 1400 great and ſmall ſhips of war were kept in conſtant ſervice for the uſe of the crown. Each ſhip carried 121 ſoldiers.

But Waldemar outlived the greatneſs of his power and the ſplendour of his glory. In the year 1223, Henry earl of Schwerin, a prince of Mecklenburg, ſurpriſed and carried him off whilſt he was engaged in a chace. The conquered countries immediately proclaimed their independence. Waldemar was kept a cloſe priſoner for three years, at the end of which he obtained his liberty on the moſt humiliating conditions, to the obſervation of which he bound himſelf by a ſolemn oath. Having however procured a diſpenſation from the pope, he attempted to regain his loſt dominions, and in the year 1227 entered Holſtein with a numerous army. But fortune no longer befriended him. His troops were defeated with great ſlaughter by the Germans at Bornhoevede. At his death, which happened in 1242, Denmark, of all his conqueſts in the Baltic, retained only a ſmall part of Eſthonia and the iſland of Rugen, which a hundred years later paſſed under the dominion of the dukes of Pomerania. Eſthonia was ſold in the year 1346 to the knights of the Teutonic order, who at that time were ſovereigns of Pruſſia.

But before theſe two laſt remnants of the conqueſts of three fortunate princes were loſt, Denmark experienced a long ſeries of misfortunes. Waldemar II. had left the crown to his eldeſt ſon Eric, and the duchy of Sleſwick to his ſecond ſon Abel. In the year 1250, Eric intreated

Abel's

Abel's mediation with the princes of Holftein, with whom he was at war; but Abel had him treacheroufly murdered at fea. Abel however did not long enjoy a crown which he had fo infamoufly acquired. His fubjects having rifen in arms againft him in 1252, he was flain in a battle which he fought to quell the infurrection.

Chriftopher I., who fucceeded Abel on the throne, had to refift the ufurpations of feveral rivals. His more fortunate fucceffor, Eric Menved, kept thofe potent vaffals in awe. But under Chriftopher II. the kingdom was torn by the moft violent factions. The nobles affumed arrogant powers; the towns to refift them, fent deputies to the herredage or diets of the kingdom; and the peafants or farmers, who as land owners had till then been ranked among thofe nobles that were not in the king's fervice, began to form a feparate clafs. Thefe encroachments left the king a bare fhadow of authority, and fcarcely any revenue. In this diftrefs he mortgaged feveral provinces to the very vaffals whofe power he vainly attempted to reduce. The death of Eric, duke of Slefwick, which happened in 1325, increafed his difficulties. The duke having left a fon under age, Chriftopher claimed the guardianfhip of the young prince; but his claim was refifted by Gerhard, earl of Holftein, as maternal uncle of the minor. Chriftopher had recourfe to arms; but was defeated near Gottorp. Encouraged in their factious views by this defeat, his rebellious fubjects proclaimed that Chriftopher and his eldeft fon Eric had forfeited the crown. Eric fell into the hands of the rebels, who kept him clofely confined in a ftrong caftle. The king himfelf fled into Mecklenburg with his two younger fons Otto and Waldemar. The young duke of Slefwick, whofe name was alfo Waldemar, was at firft proclaimed king, and his duchy given as an hereditary and independent fief to his uncle Gerhard. The factious barons provided for themfelves each at his own convenience. But this arrangement was almoft as foon annulled as formed. Waldemar kept the duchy of Slefwick; Gerhard took poffeffion of Jutland and the ifland of Funen. The difcontented nobles fhared the other iflands. The king of Sweden recovered Schonen, Halland, and Blekingen. The unfortunate Chriftopher returned to Denmark fome time after, and died in a corner of the province of Laaland, the only part of his dominions that recognized his authority. Eric his eldeft fon had paid the debt of nature before him. Otto the youngeft was a prifoner of Gerhard, by whom he had been defeated in battle. The fugitive Waldemar had found an afylum at the court of the emperor of Germany.

Waldemar of Slefwick now claimed the crown; but Gerhard his uncle enjoyed the regal power, until he was affaffinated near Randers, in the year 1340. Exafperated at the afcendency which the houfe of Holftein had gained, the nation called Waldemar, the youngeft fon of Chriftopher II., to the throne. Supported by the emperor and the margraves of Brandenburg, he eafily recovered his hereditary dominions, and reigned by the name of Waldemar III. A treaty of peace was concluded between the new king, the duke of Slefwick, and the earl of Holftein. The duke renounced the crown, but kept the duchy as an hereditary fief.

Waldemar III. foon redeemed the provinces which had been mortgaged. A fkilful negociation with Magnus Smek, king of Sweden, ended in the recovery of Schonen, Halland, and Blekingen. During his reign the foundation was laid to that political combination which for more than a century fubjected a large portion of the north of Europe to the Danifh power, and effected the ftill lafting union of Norway with Denmark. Waldemar had a daughter named Margaret, who to the graces of her fex joined talents and qualities which are generally confidered as the exclufive appanage of men, and which in the fequel gained her the furname of the Semiramis of the North. Her he married to Hakon Hagen or Haquin VII. king of Norway, fon to the king of Sweden.

Waldemar III. died in the year 1378, and with him ended the dynafty of the Eftrithides in the male line. His grandfon Olaf or Olaus fucceeded him on the throne of Denmark, and after the death of the king of Norway, afcended likewife the throne of that kingdom. But his reign was not long; he died very young, nine years after his grandfather Waldemar. His mother Margaret, being ftill a widow, inherited the double crown to which there was no male afpirant left. Her bold genius foon infpired her with a moft extenfive project.

Sweden was a prey to domeftic convulfions. Difcord raged among the nobles, the clergy, and the people. Albert of Mecklenburg had been called to the Swedifh throne. Deftitute of the qualifications requifite to fupprefs factious tumults, he fell a victim to national broils. Margaret, whofe power was firmly eftablifhed in Denmark and Norway, obferved the Swedes with a watchful eye. She kept among them emiffaries who prepared the minds of the people for her vaft defigns. A love intrigue with one of the moft diftinguifhed Swedifh noblemen enabled her to gain partizans among the nobility, and an ardent zeal for the interefts of the church, combined with a rigid obfervance of religious ceremonies, captivated alike the clergy and the people. Albert ftill fancied himfelf firmly feated on the throne of Sweden when the crown was given to Margaret by the moft powerful party. To recover his power the dethroned monarch took up arms; but the battle of Fahlkœping, which was fought in the year 1389, confirmed his misfortune.

Secure of her triple diadem, Margaret affembled the ftates of the three kingdoms in the town of Calmar, and propofed a perpetual union of the three crowns, which was decreed. Her adopted fon, Eric of Pomerania, was proclaimed her fucceffor. The memorable treaty by which the union was effected, was concluded on the 13th of July, 1397, and is known by the appellation of the "Union of Calmar."

But neither Margaret's immediate fucceffor Eric, nor Chriftopher of Bavaria, who was chofen to fucceed the latter, being poffeffed of any fhare of Margaret's abilities, the union of Calmar was not of long duration. Norway alone continued united with Denmark. The kingdom of Sweden foon recovered its independency.

Notwithftanding the folemn renewal of the union in the year 1436, the Swedes chofe Charles Knutfon for their king, and had three adminiftrators, Sten Sture the elder, Swante Sture, and Sten Sture the younger. The union, however, was not yet formally diffolved; but at length the impolitic conduct of Chriftian or Chriftiern II. was the fignal of an infurrection, which broke afunder the political chain that had been forged for Sweden at Calmar. See Sweden.

In the year 1448, after Chriftopher of Bavaria, the Danes chofe Chriftiern or Chriftian, earl of Oldenburg, for their king. He reigned by the name of Chriftian I., and it is from him that the prefent royal family of Denmark is defcended. His fon John was chofen his fucceffor in 1481, and forced to fhare Slefwick and Holftein with his brother Frederick. Like all the preceding kings who were elected by the ftates, John, and his fon Chriftian II., who fucceeded him in 1513, were obliged to fign at their acceffion to the throne, a capitulation or charter of privileges, by which they granted

granted confiderable immunities to the nobility. The Danifh monarchs were little more than prefidents of a fenate compofed of the principal nobles, who continually encroached at once on the rights of the commons, and on the prerogative of the kings. In vain did Chriftian II. attempt to refift their overbearing influence. His fiery fpirit prompted him to meafures of equal feverity againft a violent ariftocracy, and an infolent hierarchy, at a time when he was at open war with the Hanfeatic towns. Factious nobles, and arrogant priefts, mifreprefented his beft intentions, and it is difficult to afcertain whether or to what degree he deferved the ftigma of tyranny which has been affixed to his name. The Swedes were the firft to renounce him. He was obliged to fly from that kingdom. Guftavus Ericfon Vafa was proclaimed king of Sweden in 1523, and in the fame year the Danes rebelled againft Chriftian II., and called his uncle Frederick, duke of Holftein, to the throne. By flying with his wife and children into the Netherlands, Chriftian in fome degree fanctioned the election. Frederick continued in the fecure poffeffion of the crown, and reigned by the name of Frederick I. until the 10th of April 1533, when he died. The opinions of Luther, which he himfelf embraced, made great progrefs in Denmark during his reign; but the Reformation was not formally introduced before the year 1536, under his fucceffor Chriftian III. whofe fon Frederick II. affifted by his able minifter, Peter Oxe, turned the attention of the Danes towards commerce, regulated the Sound dues, and brought under his dominion that portion of the duchy of Holftein, known by the name of Ditmars or Ditmarfh.

Frederick II. was fucceeded at his death by his fon Chriftian IV. who, in the year 1615, introduced the firft ftanding army in Denmark. By the acquifition of three-fifths of the county of Pinneberg, in Holftein, he extended the fouthern part of the Danifh dominions to the very gates of Hamburgh; but experienced confiderable loffes on his eaftern and northern frontier.

The brilliant fuccefs of Guftavus Adolphus of Sweden, the abilities of the generals who had the command of the armies after this great prince, and the diplomatic talents of Oxenftierna, had given to Sweden a preponderating influence in Germany. During the protracted and intricate negociations which preceded the peace of Weftphalia, Chriftian IV. fhewed that he was not indifferent to the ambitious views of a power which he confidered as a formidable rival of Denmark; but unfortunately he raifed the Sound dues. The meafure irritated the Dutch, who at that time were the principal traders in the Baltic. They agreed with the Swedes to refift the payment of the new duties. Some Swedifh fhips were treated with uncommon feverity. This induced the Swedifh general Torftenfon to invade Holftein in 1643. He penetrated as far as Jutland. Chriftian IV., little accuftomed to war, oppofed but a feeble refiftance. The Swedifh fleets, reinforced by a Dutch fquadron, defeated the Danifh fleet. Negociations were entered into, and in the year 1645, a peace was concluded at Brömfebro under the mediation of France. Sweden obtained the iflands of Gothland and Oefel, the provinces of Jemtland and Herjedalen, which had belonged to Norway, and the ceffion of Halland for 30 years. Chriftian IV. died in 1648. The eftablifhments of the Danes in the Eaft Indies, as well as the Danifh joint companies trading to Greenland and Iceland, date from his reign.

His fon Frederick III. in the capitulation which he, like all the elective kings, was forced to fign on his acceffion to the throne, reluctantly granted ftill farther immunities to the nobles. They foon engroffed the whole adminiftration of affairs. The clergy and the commons groaned under their oppreffive meafures until thefe inteftine divifions induced Charles Guftavus, king of Sweden, to attack Denmark with a powerful army, and to befiege Copenhagen itfelf. But Frederick III. encouraged by his queen Sophia Amelia, princefs of Brunfwick Luneburg, and faithfully affifted by the inhabitants of Copenhagen, held out above two years, when preliminaries of peace were figned at Rofchild, in 1651, under the mediation of Cromwell, protector of England. Frederick ceded the provinces of Halland, Blekingen, and Schonen, the ifland of Bornholm, and the bifhoprics of Bohus and Drontheim, in Norway, to the Swedes. But the ambition of the Swedifh monarch, which aimed at nothing lefs than the total conqueft of Denmark, not being yet fatisfied, he once more befieged Copenhagen by fea and land. On the night of the 11th February, 1659, Charles Guftavus ordered a general affault; but his troops were valiantly repulfed on all points, and a Dutch fleet almoft at the fame time defeated the Swedifh fleet. The gallant fpirit of the Swedifh hero could not brook thefe misfortunes. Charles Guftavus died in the beginning of the year 1660, and Frederick III. kept the Danifh crown. A new treaty was concluded at Copenhagen, in 1660, under the mediation of France and England. The ifland of Bornholm, and the bifhopric of Drontheim, in Norway, were reftored to Denmark; but Schonen, Blekingen, and Halland, were left to Sweden.

The active zeal and intrepid conduct of Frederick during the two fieges of Copenhagen, had endeared him to his fubjects in general, and more particularly to the inhabitants of his capital. Soon after the conclufion of the treaty with Sweden, a diet was fummoned at Copenhagen, to take into confideration the diftreffed ftate of the kingdom. The deputies affembled on the 8th of September, 1660.

This Danifh diet of 1660, affords the unparalleled example of a free people deliberately refigning their liberty into the hands of a monarch whom they had hitherto controlled, and voluntarily granting him defpotic fway. To humble the nobles, the clergy and the commons concurred in rendering the power of the king abfolute. Frederick himfelf appeared to take no fhare whatever in a project which interefted him moft; but the queen was zealoufly active in augmenting the number of the king's friends. She brought over to the court party, the field-marfhal John Schack, and another nobleman of the name of Annibal Sehefted. But the principal actors in this extraordinary political revolution, were Swane, bifhop of Zealand, Nanfen, burgomafter of Copenhagen, Gabel, a German, fecretary to the privy council, and king's private fecretary, and Lenthe, likewife a German by birth.

The means of raifing the fums neceffary for the national exigencies, were the firft object of the deliberations of the diet. The nobles propofed a tax on all articles of confumption, and offered to fubmit to it themfelves, but with fo many reftrictions and exceptions, that the principal weight of the new impoft muft have fallen on the commoners. This propofal was held out as a mark of the utmoft condefcenfion, and accompanied with farcaftic reflections on the rifing influence of the commons and clergy, both of which would not admit of any tax that was not to be levied equally upon all ranks, without any referve. They demanded that the demefnes of the crown, which had till then been farmed by the nobles exclufively, fhould be let to the higheft bidder without diftinction. This demand the nobles confidered as an arrogant infringement on their privileges. Reproachful expreffions were ufed by one of the fenators. A general ferment enfued. The affembly broke up. The friends of the court,

court, availing themfelves of this ftate of irritation, fuggefted the extenfion of the prerogative of the crown as moft conducive to the happinefs of the nation at large. A fortunate incident haftened the fuccefs of their fchemes.

Bifhop Swane, one of his colleagues, the deputies of Copenhagen, and a few of other towns, had been invited to the hall of the nobility to difcufs on a point relating to the new taxes. More commoners attending than were expected, the fenator Otto Kragg, a proud and violent man, difmiffed thofe whom he thought too many. This infult increafed the general ferment. The clergy and the commons having new propofals to offer, it was afked how they fhould be communicated to the fenate. The recent affront they had experienced was yet frefh in their memory. They determined to apply directly to the prince, without any intermediate communication with the fenators. The deputation was moft gracioufly received by the king.

On the 8th of October 1660, Nanfen affembled the deputies of the commons to examine the claufes of the projected ftamp act. They difcovered that the bill had been materially altered by the fenate. Loud murmurs were heard. This general difcontent encouraged Nanfen to move that the crown fhould be rendered hereditary, in order that the king might be the mafter. The clergy were affembled at the fame time. Swane made the fame propofal, and after having conferred with the commons, read the act for rendering the crown hereditary in the perfon of the king and his pofterity, male and female, which was unanimoufly approved. It was then communicated to the fenate. The nobles met immediately, but having been taken by furprize, they feparated without coming to a determination on the fubject.

The next day a deputation of the commons, headed by the burgomafter of Copenhagen, waited upon the king to remonftrate againft the intended ftamp act. On their return from the palace, they met the fenator Kragg, who having inquired whence they came, pointed at the Blue Tower, the ftate prifon of Copenhagen, faying, "Do you know that place?" Nanfen immediately replied, "And you, do you know what is fufpended yonder?" pointing at the alarm bell in the fteeple of St. Mary's.

As the nobles had not fignified their concurrence on the 10th of October, the clergy and the commons repaired in proceffion to the fenate, where they found only four fenators. They returned in the afternoon, but Kragg anfwered, that the fenate, which befides was not complete, could not affent to the meafure propofed by two inferior orders. The deputies then proceeded to the palace, and being admitted into the royal prefence, offered to render the crown hereditary. The king anfwered that he would inform them of his refolution after he had conferred with the fenate. Nugatory negociations took place between the prince and the nobles, feveral of whom left the city with the intention to paralyfe the proceedings of the diet. To fruftrate their defign, the gates were fhut. Difpirited at this meafure, the nobles on the 12th of October fignified their concurrence fo far as to render the crown hereditary in the male line of the royal family: but this offer having been rejected, they concurred the following day with the refolution of the clergy and the commons without any limitation. A committee of the three orders was appointed to fettle the tranfaction. The choice of the members was left to the king, who appointed four fenators, four deputies of the nobles who were not fenators, five of the clergy, feven of the commons, and one of the univerfity of Copenhagen. This committee met on Sunday the 14th of October in the forenoon. Swane and Nanfen obferved a profound filence; but Lange, the deputy of the univerfity, fuggefted the neceffity of eftablifhing fundamental laws according to the example of other countries where the crown was likewife hereditary. Several deputies feconded his propofition. The principles of different conftitutions were difcuffed; but the bifhops interrupted the difcuffion by obferving that it was noon, that the hour for the afternoon's fervice was approaching, and that it was proper to adjourn the conference for a few hours. The committee fat again in the evening; but in the mean time it had been intimated to Lange that his prefence was not required. The annulling of the capitulation or charter figned by the king at his acceffion was unanimoufly agreed upon; but to fix on a new tie between the prince and the ftates was found more difficult. The nobles claimed the continuation of fome of their ancient privileges, againft which the clergy and the commons raifed violent objections. To end their clamorous debates, the bifhop of Zealand propofed to render the crown hereditary without any ftipulation, and to leave to the impartiality of the monarch the decifion of a point on which they, who were moft concerned in it, could not agree.

On the 16th of October 1660, the three orders framed the decree by which they rendered the government hereditary in the male and female line; ftipulating only the right of primogeniture, and the indivifibility of the monarchy. Nothing, however, was mentioned of abfolute fovereignty. Frederick Gabel, fon of Chriftian Gabel, fecretary to the privy council, who has been named before as one of the principal agents for the court party, ftates in his memoirs, that his father fecretly procured the infertion of *abfolute fovereignty* in the act by the printer, and thus contributed to render the power of the Danifh monarchs abfolute: but moft of the Danifh writers doubt the truth of his affertion. Indeed the term is found in other acts publifhed before the royal law, which eftablifhed the defpotifm of the Danifh kings.

The new oath of allegiance was taken on the 18th of October. The king promifed to eftablifh a form of government by which his fubjects fhould be certain of enjoying the advantages of a Chriftianlike and merciful adminiftration under his fucceffors. The firft edict which explicitly proclaims the abfolute power of the king was publifhed in Denmark on the 10th of January 1661, in Norway on the 7th of Auguft 1661, in Iceland on the 28th of July 1662, and in the Faro Iflands on the 14th of Auguft of the fame year. It was only four years after, that the royal law of Denmark, which is ftill the bafis of the Danifh conftitution, was framed by bifhop Swane and the king's fecretary Schumacher, afterwards known by the name of count Griffenfeld. This conftitutional act received the king's fignature on the 14th of November 1665, but remained in the archives of the crown during the reign of Frederick III., and was only promulgated on the acceffion of Chriftian V. to the throne in 1670. Frederick IV. caufed this law to be engraved in 1709, with an introduction of his own; an abftract of it will be given under the head of the Danifh Conftitution.

From all thefe circumftances, on which we have purpofely expatiated with fome length, it appears evident that the Danifh people were with much addrefs cajoled into the acceptance of a defpotic government. The intentions of the commons to diminifh the power of the nobles by rendering the crown hereditary, did not imply that they meant to renounce their ancient freedom, and to inveft the monarch with unbounded authority. They were gradually drawn into this conceffion. When the royal law was promulgated, they could not recal the fteps they had taken,

 and

and perhaps the joy which they felt at having crufhed their noble oppreffors, rendered them infenfible to the chains which they had eventually forged for themfelves.

Frederick III. was fucceeded, in 1670, by his fon Chriftian V. Not only was the royal law proclaimed at his coronation, but he alfo introduced feveral new regulations, which all tended more or lefs to ftrengthen his abfolute power. He raifed feveral nobles to the dignity of counts and barons, fixed their privileges, and inftituted the Danebrog order of knighthood. The acquifition of the counties of Oldenburg and Delmenhorft, in Weftphalia, which reverted to Denmark through the death of the earl Anthony Gunther, compenfated in fome degree for Chriftian's loffes in Sweden, with which power he had been forced to fign a treaty on the terms prefcribed by France, after an obftinate and unfuccefsful war. He was alfo forced to reftore the duchy of Holftein to duke Albert, whom he had treacheroufly detained at Rendfburg, and whofe poffeffions he had invaded. By the treaty concluded at Altona in 1689, under the mediation of the emperor of Germany, the king of Sweden, and the republic of Holland, Albert was alfo confirmed in the poffeffion of Slefwick.

Chriftian V. died in 1699. His fucceffor Frederick IV. jealous of the increafing rival power of Frederick duke of Holftein, who had married the fifter of Charles XII. of Sweden, laid fiege to Tonningen, which the duke had fortified with particular care. Charles XII., bent upon avenging his brother-in-law, invaded Denmark, and would have taken Copenhagen, had not the Danifh king agreed to the peace of Travendahl, which was concluded in 1700, in favour of the duke. But fortune having at length deferted Charles, after a feries of the moft aftonifhing fucceffes, his general, Stenbock, was forced to throw himfelf into Tonningen, whilft Charles was an exile at Bender. This circumftance occafioned a new war in Holftein. Frederick, the brother-in-law to Charles, had been killed at the battle of Cliffau in 1702. His fon Charles Frederick, a minor, reigned under the guardianfhip of his uncle Chriftian Auguftus, bifhop of Lubeck. When Tonningen opened its gates to Stenbock, the king of Denmark accufed the houfe of Holftein Gottorp of being leagued with Sweden, and occupied the duchy with his troops. At the death of Charles XII. the young duke claimed the Swedifh crown, but was forced to yield to Ulrica Eleonora and Frederick of Heffe Caffel, her hufband. The king of Denmark concluded a peace with the young duke in 1720, by which he kept poffeffion of Slefwick, and reftored only part of Holftein. As Sweden did not oppofe thefe terms, and as the obfervation of the treaty was guaranteed by England and France, Charles Frederick fubmitted, but folemnly protefted againft the injuftice of the arrangement. He foon after married the eldeft daughter of the czar Peter the Great; and in 1741, their fon Peter Ulric was nominated by the emprefs Elizabeth, heir to the Ruffian dominions.

After the death of Frederick IV. his fon, Chriftian Frederick, better known by the appellation of Chriftian VI., mounted the Danifh throne in the year 1730. To render his fubjects happy was the firft wifh of his heart, and to promote the arts of peace his principal ftudy. The ruins of the palace of Copenhagen, which was deftroyed by fire in 1794, evince his tafte in architecture. A difpute with the king of England, in 1738, about the lordfhip of Steinhorft, in which fome blood was fpilt, terminated in a treaty by which Great Britain paid a fubfidy of 70,000 *l.* fterling a-year, on condition that Denmark fhould keep 7000 troops on foot for the protection of Hanover.

Chriftian VI. died in 1746, and was fucceeded by his fon Frederick V. who, three years before, had married the princefs Louifa, daughter to the king of England. Affifted by the elder count Bernftorf, he improved upon his father's plans for the happinefs of his people: but the new financial and commercial regulations which he introduced were chiefly the work of count Schimmelmann. He took no concern in the feven years' war in Germany; yet it was through his mediation that the capitulation of Clofter Seven was agreed upon between the late duke of Cumberland and the French general Richelieu. Some time after the death of his firft queen, who was the mother of his fucceffor, Chriftian VII., Frederick V. married a daughter of the duke of Brunfwick Wolfenbuttel. Towards the latter end of his reign, Peter Ulric of Holftein, who had afcended the throne of Ruffia, revived his pretenfions to the whole of Holftein and the duchy of Slefwick. His menaces unfortunately induced Frederick to call into his fervice the count St. Germain, a French officer, whofe injudicious and hafty reforms in the Danifh army had almoft caufed in Denmark a revolution as fatal as that which his rafhnefs in reforming the French military prepared for France. The Ruffian general Romanzow was ordered to enter into Holftein, but he had not yet reached his deftination when Peter loft his crown and his life. Catherine recalled the army, and Denmark continued to enjoy the comfort of peace. Another part of Holftein, that of Ploen, had reverted to Denmark in 1761. As foon as the authority of Catherine was firmly eftablifhed in Ruffia, the court of Copenhagen made fome propofitions to the court of St. Peterfburg relative to the exchange of the remaining part of Holftein Gottorp againft the counties of Oldenburg and Delmenhorft: but whilft the count Ernft Bernftorff, minifter of foreign affairs, was zealoufly exerting himfelf in the accomplifhment of this project, Frederick V. died on the 14th of January, 1766.

His fon Chriftian VII. fignalized his acceffion to the throne by the emancipation of the peafants on the royal demefnes, who till then had been held in a ftate of dependence not far fhort of flavery. A provifional convention was figned with Ruffia in 1767, refpecting the exchange of Holftein; but the tranfaction itfelf was delayed till Paul Petrowitz, as heir of the German poffeffions of the unfortunate Peter Ulric, had attained the proper age to ratify the treaty by his fignature.

Chriftian VII. married the Englifh princefs Caroline Matilda, youngeft fifter to king George III. But his want of firmnefs, and the intrigues of the queen dowager his mother-in-law, involved the young queen in the moft ferious misfortune. Ambitious to raife her own fon Frederick to the throne, the queen dowager fowed the feeds of diffenfion between the king and his confort. She placed perfons about the monarch to keep him conftantly engaged in riot and debauchery, and magnified his faults to the unfufpecting queen, who yet contrived to live on good terms with her royal hufband. All the plans of the old queen failed until the king raifed his phyfician, Struenfee, a young German doctor, to the dignity of a count, and appointed him his prime minifter. Inftigated by an unbounded ambition, this giddy young man, who was not without a fhare of great political talents, rafhly began to introduce the moft unexpected reforms, which created him an hoft of enemies among the old courtiers whom he difplaced. Deaf to the warning voice of his friend Brandt, who fhared with him the royal favour, he attempted innovations in feveral departments of the ftate at once. Some of the principal military officers attached to the queen dowager, accufed him loudly of an intention to overthrow the government by fuperfeding the king on the fcore of incapacity, and declaring

claring Carolina Matilda regent of the kingdom during the minority of her fon.

On the 16th of January 1772, a mafked ball was given at court. The young queen, after having danced the greateft part of the night with Struenfee, retired about two in the morning. At four, prince Frederick and the queen dowager, accompainied by general Eichftedt and count Rantzau, went to the king to inform him that the queen, with count Struenfee and Brandt, were at that moment drawing up an act of renunciation to the crown, which they would compel him to fign, and that he muft give immediate orders for their being arrefted. The king hefitated, but having been threatened into compliance, count Rantzau proceeded to the apartments of the queen, and conveyed her, together with her infant princefs, to the caftle of Cronenburg. Struenfee and Brandt were confined in feparate dungeons, ironed, and treated with barbarous feverity. They underwent frequent examinations. The fear of the rack extorted from Struenfee the confeffion of a criminal converfation with the queen. She certainly appears to have taken particular delight in the fociety of him, who was the favourite of her hufband; yet no intimacy between them was ever proved. Struenfee and Brandt, after having had their right hands cut off, were beheaded on the 28th of April 1772. Their bodies were quartered. A treatment fo inhuman reflects no fmall difgrace on the prince, who had honoured Struenfee in particular with the name of friend. By the interference of the Englifh minifter, queen Carolina Matilda was fuffered to leave Denmark in a Britifh frigate, which conveyed her to Hanover. She refided in the palace of Zell, where fhe died three years afterwards, aged 23 years and 10 months.

After this fanguinary revolution, count Guldberg was placed at the head of the king's council. He rendered his adminiftration popular by the promulgation of a law in favour of the natives of Denmark, called the law of "indigenate," and confidered as one of the fundamental laws of the kingdom. The grand duke Paul Petrowitz having in the mean time attained his majority, the negociations with Ruffia were refumed, and a definitive treaty figned at Gaifkoezelo on the 21ft of May, and at Fredenfburg on the 1ft of July 1773. By this treaty the counties of Oldenburg and Delmenhorft were ceded to the grand duke of Ruffia, inftead of which the king of Denmark was put in poffeffion of the whole of Holftein. Paul Petrowitz renounced the two counties in favour of Frederick Auguftus, bifhop of Lubeck, from whom they devolved to his fon, Peter Frederick William, who was raifed to the dignity of a duke of the German empire.

In 1780 Chriftian VII. acceded to the armed neutrality propofed by the emprefs of Ruffia. But the debility of his underftanding difqualifying him every day more and more for the management of public affairs, another court revolution took place on the 14th of April, 1784. The queen dowager's friends were removed from the king's councils, and a new council was formed under the aufpices of the crown prince, who had not yet attained his feventeenth year. No inftrument figned by the king was declared to be valid, unlefs counterfigned by the crown prince. The commencement of the adminiftration of this prince was marked by the moft beneficial meafures for the profperity of the country. By the advice of count Bernftorff, the younger, the Danifh peafants were all reftored to complete freedom, and their emancipation was accomplifhed in a manner fo gradual and fo cautious, that it challenges imitation wherever the chains of a long flavery are to be broken. The flave-trade was alfo gradually abolifhed by the difinterefted exertions of count Schimmelmann, who was himfelf poffeffed of large eftates in the Danifh Weft-India iflands. Order was reftored to the finances of the country, the national debt reduced, ufeful knowledge more generally diffufed by the moft liberal patronage beftowed on focieties for the promotion of learning, arts and fciences, the adminiftration of juftice improved, induftry encouraged, commerce freed of its former fhackles, and in the midft of the wars occafioned by the French revolution the ftricteft neutrality was maintained. Every folicitation to declare againft France proved vain, but the menaces of Ruffia fucceeded at length in determining Denmark to accede to the confederacy which the northern powers formed againft Great Britain in 1801. This league however was quickly diffolved by the appearance of an Englifh fleet under admirals Parker and Nelfon, in the Baltic, and Nelfon's forcing the line of defence formed by the Danifh fleet before Copenhagen, on the memorable 2d of April 1801, when the Danes fought with a bravery equal to that of their gallant oppofers. The difpute between Great Britain and the northern powers being foon after amicably fettled, Denmark recovered the iflands in the Weft Indies, and the fettlement of Tranquebar, on the coaft of Coromandel, which had been forced to yield to the Britifh arms.

The battle of the 2d of April 1801, had interrupted the calm of an eighty years' peace, and appeared to be the commencement of a new era in the naval and military eftablifhments of Denmark, which received fo great an acceffion of ftrength, that full confidence was repofed in the future exertions of either the army or navy on any emergency. Yet the war between England and France having been renewed in 1803, and France having fucceffively triumphed over Auftria and Pruffia, and formed an intimate connection with Ruffia, it was fuppofed that Denmark would no longer be able to refift the united folicitations of Ruffia and France, and be forced to declare againft England, particularly as a confiderable French and Spanifh force was hovering on its frontier. Under this fuppofition, the Englifh miniftry propofed to the crown prince to furrender the Danifh navy into the hands of the king of Great Britain, until the reftoration of a general peace. This propofal was indignantly rejected, the prince afferted his ability, and protefted his readinefs to maintain his neutrality, and to defend his country againft the firft power that dared to attack it. The peace of Tilfit, which France had juft concluded with Ruffia and Pruffia, left to that ambitious and daring power fuch irrefiftible means to compel the feeble kingdom of Denmark to turn its weapons againft England, that the latter country confidered herfelf juftified in reforting to extraordinary meafures. In the month of Auguft, 1807, a ftrong Englifh fleet furrounded the ifland of Zealand, and landed an army of 20,000 men. Copenhagen was bombarded. (See COPENHAGEN.) On the feventh of September the Englifh took poffeffion of the citadel for fix weeks, and all the Danifh fhips then at Copenhagen, being 18 fail of the line, 15 frigates, fix floops, and 25 gun-boats, together with all the ftores of the naval arfenal of Chriftianfholm, were furrendered to the difpofal of the king of Great Britain. Exafperated at this treatment, the crown prince declared war againft England, and foon after againft Sweden, its only ally. He invoked the aid of France. The French marfhal Bernadotte (prince of Ponte Corvo) arrived at Copenhagen on the 16th of March, 1808, at the very moment when intelligence was received in that capital of the death of Chriftian VII., who died at Rendfburg on the 13th of March, 1808. The crown prince was proclaimed king on the 16th of March by the name of Frederick VI.

On the 22d of March, the prince Chriftian, Danifh man of war, ftruck to the Englifh, after an obftinate engagement,

in which the Danes had 50 killed and 88 wounded. As the fhip had been run afhore, fhe was fet on fire and burnt. Thus the Danifh navy was reduced to one fingle fhip of the line.

In the mean time 15000 Spanifh, 10 000 French, and 5000 Dutch troops, entered the Danifh continental dominions to affift the Danes, and 387 veffels were taken up for the invafion of Sweden. Several privateers haraffed the Englifh traders in the Baltic, and committed fuccefsful depredations. Frequent engagements took place between Danifh gun-boats and Englifh brigs. The Swedes, under baron Armfeldt, entered Norway, and drove the Danes acrofs the Glommen, but could not penetrate to Chriftiania. A ftrong Englifh armament, under the command of fir James Saumarez, prevented the intended attack upon Sweden. Bernadotte complained in May of the remiffnefs of the Danifh government in completing the warlike preparations neceffary for the execution of the plans with which he was charged. The ifland of Heiligeland, at the mouth of the Elbe, which is confidered as part of Slefwick, and the Danifh poffeffions in the Eaft and Weft Indies, were occupied by Englifh troops.

For the remainder of the hiftory of Denmark, from the month of July 1808, fee NORWAY.

The boundaries of Denmark Proper are, the river Eyder to the fouth, which divides it from Holftein, and confequently from Germany; to the weft the North fea, or German ocean, which the Danes call the Weftern ocean; to the north that part of the north fea which is called the Cattegat, and Shaggerack, by which it is divided from Norway; and to the eaft that inlet into the Baltic fea, known by the name of the Sound, or Ore-Sound, which divides Denmark from Sweden.

The extent of Denmark Proper is about 4964 Englifh fquare miles. It is divided into two parts, the peninfula of Jutland, anciently called Cherfonefus Cimbrica, and the iflands at the entrance of the Baltic.

Jutland was anciently divided into North and South Jutland; but the former is now fimply called Jutland, and the latter Slefwick, which fee.

The iflands at the entrance of the Baltic are two large ones, Zealand and Funen, and five fmall ones, Laaland, Langeland, Falfter, Moen, Bornholm, which fee.

Denmark Proper counts 68 towns, 22 market towns, 7000 villages, 948 lordfhips, and 15 earldoms or counties. The principal towns are Copenhagen, Flenfburg, Elfineur, Slefwick, and Odenfee.

The climate of Denmark Proper is variable and moift, but rather temperate on account of the vapours of the furrounding fea. In the northern parts the winter is fometimes very fevere; the entrance of the Baltic through the Sound is often obftructed with ice, and has been at times fo completely frozen over as to be croffed by heavy loaden carriages.

The foil in general is rather fandy, but fertile in grain and pafturage. The weftern coaft of Slefwick is expofed to the inroads of the North fea, on which account it is kept embanked at a very great expence, and thefe embankments are often extended. The land which the fea leaves behind is uncommonly fertile, and is called *koog*. The appearance of the country in general is low and flat. There are but a few hills of a bleak and wild afpect, and fome high cliffs on the coaft; yet the country is agreeably variegated with woods and lakes. Denmark has alfo many little ftreams which interfect the country in various directions. Two of them, the Guden, and the Eyder, deferve the name of rivers. In the northern part, a large creek of the fea called the Lymfiord, extends from the Cattegat through more than feventy Englifh miles. It is navigable, and contains numerous fmall iflands. The Baltic and the North fea communicate by three great inlets acrofs Denmark Proper, and on its northern frontier, *viz.* the Sound, the Great Belt, and the Little Belt. The diftance from Elfineur to Helfinborg in Sweden, acrofs the Sound, is 1331 fathoms, or about 2½ Englifh miles; between Copenhagen and Malmoe in Sweden, the diftance is nearly 20 Englifh miles. The paffage over the Great Belt from Nyeborg in Funen to Corfoer in Zealand is about 20 Englifh miles, and from Affens to Aaroefundsfarge over the Little Belt, about 10; but there is another paffage between Middlefarth and Snoghey, which is not quite two Englifh miles.

Denmark has an extenfive fea-coaft; which, befides yielding a little amber, abounds in oyfters, mufcles, and herrings, and affords uncommon conveniencies for trade. The roads are not very good; the turnpike roads extend only about 90 miles from Copenhagen.

The population of Denmark, including Norway, Iceland, Greenland, and the Faro iflands, amounts to two millions and a half, *viz.*

Denmark Proper counts	930,000 inhabitants.
Slefwick and Holftein	620,000
Norway, Iceland, &c.	950,000

From 1769 to 1785, the whole population had been increafed by 200,000 fouls. The annual average furplus of the born over the dead is from 12 to 20,000.

In 1794, the numbers were;

Of the born in Denmark Proper	27,539	Dead	25,956
Slefwick and Holftein	17,642		14,306
Norway, Iceland, &c.	28,069		17,344
Born	73,250	Dead	57,606
	57,606		
Surplus	15,644		

In 1806 the numbers were;

Of the born in Denmark Proper	29,949	Dead	22,588
Slefwick and Holftein	18,533		14,635
Norway, Iceland, &c.	26,777		18,482
Born	75,259	Dead	55,705
	55,705		
Surplus	19,554		

The language of Denmark is that dialect of the Teutonic, which is called the Scandinavian. It differs very little from the Swedifh language; its chief difference feems to arife from the drawling tone with which it is pronounced by the Danes. The pronunciation of the Norwegians comes nearer that of the Swedes. There is befides a greater admixture of German words in the Danifh language, than in the Swedifh, the German language being univerfally fpoken beyond Flenfburg, in Slefwick, till very near the Little Belt, and generally underftood in the capital. It is but lately that the Danes have taken any pride in their own language. All the laws and public infcriptions are now in Danifh.

Some fuller's earth, alum, and vitriol found in Jutland, and fome porcelain clay obtained in the ifland of Bornholm, feem to conftitute the whole of the mineral productions of Denmark Proper. The fifheries thrive beft on the weftern coaft of Jutland, and in the creek called Lymfiord. Herrings and flounders are exported on a fmall fcale from Aalburg and Skagen. The oyfter banks, which extend from Rypen to Heiligeland, are let to farmers on account of the crown.

With regard to agriculture, Denmark and Holftein produce rye, barley, oats, and wheat in fuch abundance, as to fupply Norway, and frequently to export corn to other countries to the annual amount of 100,000*l.* fterling. In 1803, an attempt was made in the vicinity of Copenhagen towards cultivating madder. The plant fucceeded uncommonly well, though it ftood a fevere winter. The crop proved of a fuperior quality. Hops are cultivated chiefly in Funen, tobacco near Fredericia in Jutland, and in Zealand, and Falfter: Rape-feed chiefly in Slefwick and Holftein. The agriculture of Funen and the fouth of Jutland is compared by Mr. Marfhal to that of England.

Since the emancipation of the peafants, agriculture, in all its branches, has been rapidly improving in Denmark. But the Danifh farmers are chiefly known as excellent graziers. Denmark fupplies Germany, France, Ruffia, and Sweden with horfes for both heavy and light cavalry, befides coach-horfes. Thofe of Zealand, Funen, Jutland, Slefwick, and Holftein are moft efteemed. The annual amount of the horfes fold is reckoned 200,000*l.* fterling. Black cattle are exported in great numbers to Holland. Many thoufands of oxen, after they have been fattened in the marfh lands, are fent to the German markets. Salt-beef, butter, and cheefe, form confiderable articles of trade. Live hogs and great quantities of bacon are exported to Norway, Holland, and feveral ports of the Baltic. In 1780 they counted in Denmark 847,000 fheep. The beft wool is that near Eyderftadt; it is long and fine.

Horticulture is very much encouraged in Denmark. Government furnifhes the farmers gratis with fruit trees from the royal nurferies.

In the beginning of the eighteenth century, Denmark was almoft without manufactures. It was only at the end of the northern war that Frederick IV. could ferioufly think of encouraging their introduction into his dominions. His fucceffor Chriftian VI. zealoufly exerted himfelf in promoting their fuccefs. The importation of cloth, filks, and other articles, was ftrictly prohibited. Government has continued ever fince to fpur the induftry of the Danes. From the year 1736 to 1774 not lefs than 800,000 dollars have been fpent on the encouragement of manufactures. Ancient prohibitory regulations have often been renewed; the queftion has even been agitated whether the importation of foreign manufactures could be reftricted by a national coftume; and fo late as 1783, an attempt was made to wean the Danes from foreign luxuries by means of fumptuary laws. But the Danifh manufactures are not yet fufficient for the home market.

Linen cloth is wove in feveral places, yet Denmark is obliged to purchafe a third of the coarfe and almoft all the fine linen it wants from abroad. However fpinning fchools, and premiums awarded to the beft fpinners and weavers, ftrengthen the hope of the Danifh government that the linen manufactures will rapidly improve. Neither is fail cloth manufactured in fufficient quantity. Of the woollen manufactures, that of the Goldhoufe at Copenhagen, which is a monopoly of the crown, is the moft important. With worfted ftockings Denmark is abundantly provided from Iceland and the Faro iflands. This manufacture flourifhes likewife in Jutland, where many a fingle village produces annually from 16 to 20,000 pair. The filk manufacturers of Copenhagen and Altona make all forts of filks, chiefly ribbands and ftockings. But the calico-printing and cotton manufactures of Copenhagen, Hufum and Wandfbeck, are far more extenfive. Hence the importation of cottons and prints is totally prohibited. The thread lace maufacture of Tondern, which was begun in 1646, and employed moftly Dutch thread, though not fo flourifhing as formerly, gives ftill employment to 10,000 hands. Paper mills are not yet fufficient for the home-confumption. Denmark imports annually 100,000 dollars worth of foreign paper. New mills are however every day eftablifhed, and the exportation of rags has been ftopped.

Denmark is abundantly fupplied with tanners and leather curriers, chiefly and beft at Altona. Danifh leather gloves, which are principally made at Odenfee, are famous all over Europe. The goodnefs of the leather at this place is fuppofed to arife from a certain property in the river water, in which it is foaked, for tanning. The manufactures of earthen ware flourifh moft at Aarhuus and Rypen, which fend their pottery into feveral parts of Germany. The royal china manufacture of Copenhagen makes excellent ware, but it ftill wants the affiftance of government. The amount of the goods manufactured from 1785 till 1792, was 277,349 dollars; but no more than 185,539 dollars could be difpofed of. There are feveral fugar refiners, copper, brafs, and iron works, and cannon founderies. The moft important among the latter is that which was eftablifhed in 1756 by general Claufen, at Frederickfwerk near the Ifefiord, a bay of the fea on the northern fhore of Zealand. The works confift of a foundery for cannon and balls, and for making faltpetre and gunpowder. Count Schimmelmann's manufactory, near Elfineur, furnifhes the army with mufkets, bayonets, and fabres. It fabricates annually 3500 mufkets.

Anciently the whole trade of Denmark was carried on exclufively by the Hanfeatic towns. Their firft competitors were the Dutch, and afterwards in fome degree the Englifh. Chriftian V. encouraged his fubjects to trade beyond the feas, but it was only after peace had been reftored in the north under Frederick IV. that the Danifh commerce began to flourifh. It rapidly extended under Chriftian VI., and was at its greateft height in 1792, if an opinion may be formed from the number of merchant veffels. In 1747 they amounted to 1748, twenty years later to 2053, in 1792 to 3331, and in 1799 only to 2173. But it ought to be remembered that the tonnage of fhips has been of late years every where increafed.

The trade of Denmark, with its dependencies and colonies, is confiderable. That with Iceland, which had long been clogged by reftrictions, exclufive companies, and monopolies of the crown, has been tripled within the laft five and twenty years, fince it has been a free trade. It employs now from 60 to 70 veffels, and is carried on in Danifh bottoms only. The trade to the Faro iflands, which within the laft fifteen years has been opened to all Danifh fubjects, employs but a few veffels. That to Finmark has alfo been allowed free to all Danifh fubjects fince 1789, and bids fair to become of great importance. The Greenlanders exchange their fifh, oil, whalebones, and downs with the manufactures of Europe, and fome colonial produce: but the whale fifhery conftitutes the principal part of the Greenland trade. The trade to Norway is moftly a paffive one in Danifh and foreign veffels. The Danifh north and Iceland companies are both extinct.

The trade to the Eaft Indies is in the hands of a privileged company, but not exclufively. Private individuals may fit out veffels for the Eaft Indies and China, on their own account on paying to the company five *per cent.* for what they export, and eight *per cent.* on the return cargoes. In 1797, there were 11 return cargoes for private account, three of which came from the Danifh eftablifhments, and eight from other ports in the Eaft Indies. In 1798 and 1799, the return cargoes for private account were thirteen

in number, four from Daniſh and nine from other eſtabliſhments in the Eaſt Indies. The increaſed vigilance of the Britiſh government againſt the ſmuggling of tea into England, and the commutation act, have cauſed a remarkable declenſion in the proſperity of the Daniſh Eaſt India company. Only one ſhip has returned annually from Canton ſince 1789, and in 1792 and 1794 there has been no return cargo whatever for the company's account. The dividend in 1797 was 12 *per cent.*

Since the year 1754, the trade to the Weſt Indies is free to all Daniſh ſubjects; yet Copenhagen receives almoſt excluſively the return cargoes from St. Croix, which iſland in 1792 ſent 60,949 cwt. of ſugar, 7000 puncheons of rum, and 1500 cwt. of cotton. The two other Daniſh Weſt India iſlands, St. Thomas and St. John, furniſhed about half as much. They ſend beſides coffee, tobacco, and other colonial productions, which they purchaſe from the neighbouring Antilles. The whole Daniſh Weſt India trade employs in time of peace 30 ſhips and 500 ſailors annually.

The trade to the Mediterranean has been very much improved ſince the year 1755. In 1798, 126 Daniſh veſſels ſailed for Meſſina, Barcelona, Algeſiras, Marſeilles, Toulon, Naples, Leghorn, Genoa, Venice, Ancona, and Trieſte; and Denmark counted 55 return cargoes from the Mediterranean. Moſt of the Daniſh veſſels are employed in the carrying trade, the Daniſh flag being reſpected by the dey of Algiers and the Sublime Porte.

Denmark has alſo a briſk trade with Germany, the countries round the Baltic, Sweden, and Pruſſia. But the balance ſeems to be againſt Denmark, ſince it imports much linen and woollen cloth, wood, brandy, and haberdaſhery from Germany; corn, flax, hemp, wool, and other articles from Pruſſia. This trade employs above 300 veſſels. The whole Daniſh export and import trade is however chiefly carried on in Daniſh bottoms; and its extenſive carrying trade, together with the great balance of production in Norway, leaves no doubt that the balance of trade upon the whole is in favour of the Daniſh dominions. In 1803, there were entered inwards into the ſeveral ports of Great Britain, from the ports of Denmark and Norway, 1536 ſhips, two-fifths of which were Britiſh.

Copenhagen is the emporium of the Daniſh trade, and has increaſed with it in ſize and wealth. In 1798 there were entered inwards at Copenhagen

2066 veſſels from foreign ports,
2490 from Daniſh ports,
414 from Norway,
912 from Sleſwick and Holſtein,
92 from the Eaſt and Weſt Indies.

In all 5974

The other commercial places in Denmark Proper are Elſineur, Aalborg, and Colding; in Norway, Bergen, Drontheim, and Drammen; in Sleſwick, Flenſburg; in Holſtein, Altona and Gluckſtadt.

Accounts in Denmark are kept by rixdollars, marks, and ſhillings, 16 of which make a mark, and ſix marks a dollar. Two mark Daniſh and two ſhilling Daniſh are equal to one mark and one ſhilling Lubiſh. Since 1788, ſpecies has been coined for Sleſwick and Holſtein, which is alſo current in Denmark Proper, and is 25 *per cent.* better than the old currency. Its double value is ſtamped on each piece, as one ſpecies dollar 60 ſhilling currency. This coin comes down to all ſizes, as low as the 24th part of a ſpecies dollar, or $2\frac{1}{2}$ ſhilling currency. The actual coins current are in gold, Chriſtian-d'ors at five dollars, and ducats at 12 marks Daniſh, or ſix marks Lubiſh; in ſilver, crowns at four marks Daniſh. There are alſo 24 ſhilling pieces, four of which make a rix-dollar, 16, 12, 8, 4, 2, and 1 ſhilling pieces; in copper, fyrke or dreilinge, two of which make a ſhilling. Beſides theſe coins, there is an extenſive paper currency, conſiſting of the notes of the Copenhagen and Altona banks.

Sciences and arts flouriſh to a great degree in Denmark, which has to boaſt of the celebrated aſtronomer Tycho Brahe. It has two univerſities, one at Copenhagen, where moſt of the learned ſocieties are eſtabliſhed, (ſee COPENHAGEN,) and the other at Kiel, which ſee. Kongſberg has, ſince 1786, a ſeminary for miners, in which mathematics and mineralogy are publicly taught. There are reading clubs in Zealand and Jutland, where the peaſants read the newſpapers and public journals. The preſs is under no ſtricter regulations than in England: *viz.* that no printer dares print anonymous publications without making himſelf liable to anſwer for their contents, or to give up their author. The Daniſh government has acknowledged the principle, that the more a ſtate is verging towards deſpotiſm, the more it ought to allow the liberty of the preſs. It is by that means only, that the ſubjects of a deſpot are raiſed to the rank of citizens. But the Daniſh government has often abandoned this principle; and where is the ſafety in a deſpotic country, that this will not frequently be the caſe?

The predominant religion of Denmark is the Lutheran, and the religious inſtitutions connected with the ſtate relate excluſively to this church. The hierarchy conſiſts of twelve biſhops or ſuperintendents; ſix in Denmark, *viz.* Zealand, Funen, Ripen, Aarhuus, Wiborg, and Aalborg; four in Norway, *viz.* Chriſtiania, Chriſtianſand, Bergen, and Drontheim; two in Iceland, *viz.* Skaalholt and Hoolum. There is no archbiſhop; but the biſhops of Zealand and Chriſtiania are metropolitans. The inferior clergy are archdeacons or provoſts, pariſh prieſts, and chaplains. Holſtein has no biſhop, but only a general ſuperintendent. The livings ſeldom exceed 400*l.*; but never fall ſhort of 60*l. per annum*, excepting in Iceland, where ſome livings are hardly worth 5*l.*, and the beſt do not exceed 20*l.* a-year. The king, as ſupreme head of the church, nominates the biſhops; but the archdeacons are choſen by the pariſh prieſts, and the latter by the patrons of the livings.

At Copenhagen, Altona, and Frederickſtadt, other creeds are tolerated. The Mennonites, in the juriſdiction of Haderſleben, enjoy great privileges; they are exempted from the military conſcription. The Jews are moſt liberally treated in the Daniſh dominions. They are 1500 in number at Copenhagen, and 2500 at Altona.

The Danes in general are religious without ſuperſtition, and the lower orders, though bigotted, are leſs ſo than the Norwegians. Their morals are upon the whole tolerably pure. The predominant vices of the lower claſſes are lazineſs, gluttony, and an exceſſive fondneſs for ſpirituous liquors; that of the higher orders the love of ſhow and pleaſure. The manners of the nobility and gentry are refined and eaſy, partaking rather of the old French ſchool. All ranks are equally attentive to ſtrangers. Hoſpitality and affability pervade all claſſes. The favourite diverſions of the Danes are the theatre, cards, muſic, dancing, and in winter driving on ſledges over the ſnow. The middle ranks, to enjoy their favourite amuſement of dancing and playing at cards, meet in clubs, the number of which at Copenhagen is greater than in any other town on the continent of equal or ſuperior population. Thither they take the ſtranger to whom they wiſh to ſhew any civility; and thus avoid the expence of an entertainment at their own houſes. There are no baths nor watering places in Denmark.

The

The conftitution of Denmark, as eftablifhed by the Royal Law, Kong's Low, Lex Regia of the 14th of November 1665, is an abfolute monarchy: the king is bound by no human law; and either in ecclefiaftical or civil affairs, acknowledges no fuperior or judge but God. He has the power of making and repealing laws. He is the fource of all titles, dignities, honours, and offices. He has the power of making war and peace, of forming alliances, and impofing taxes. He is the fupreme chief of the church, and alone enjoys every right of fovereignty by whatever name it may be called.

But the king of Denmark muft be of the Lutheran church, defcended from Frederick III. born in wedlock. He is of age at his entering his fourteenth year. At the death of a king the throne devolves inftantly to the next heir without any other formality; but the new king muft be folemnly anointed and crowned, and this ceremony may take place even during his minority.

The infignia of the coronation are kept in the royal palace of Rofenburg.

The Danifh nobility have no fhare whatever in the government. There are no dukes but of the royal family. Befides the duke of Holftein Auguftenburg, there is no other Danifh prince on appanage. Neither are there any marquiffes. The nobles are fimply counts, barons, and noblemen.

Frederick VI. the prefent king of Denmark, was born on the 28th of January 1768 of Chriftian VII. king of Denmark, and Carolina Matilda, princefs of England. He fucceeded his father on the 13th of March 1808.

The royal title is: Frederick VI. by the grace of God, king of Denmark and Norway, of the Goths and Vandals, duke of Slefwick, Holftein, Stormarn, Ditmarfh, &c. The title of the eldeft fon is crown prince. The younger fons are called hereditary princes. The royal arms are parted by the Danebrog crofs into four principal quarters. In the firft or, three lions paffant gardant azure, furrounded with nine hearts gules for Denmark. In the fecond gules, a lion rampant crowned or, holding a Danifh battle-axe argent for Norway. In the third azure three crowns or for Denmark, Norway, and Sweden. In the fourth or a lion leopardifed azure, with nine hearts gules for ancient Gothland. The inefcutcheon quarterly in the firft or two lions paffant azure for Slefwick. In the fecond gules three nettle leaves argent, pierced with three nails of the crofs charged with a fmall efcutcheon argent for Holftein: in the third gules a cygnet argent gorged with a crown or for Stormarn: in the fourth gules, a cavalier armed argent, holding a fword pommelled or for Ditmarfh. Upon all, an inefcutcheon in the centre party per pale, or two bars gules for Delmenhorft; and azure a crofs party or for Oldenburg. The fupporters are two favages armed with clubs.

There are but two orders of knighthood in Denmark. The firft is the order of the Elephant, of which Canute VI. is falfely confidered as the founder. In 1464 Chriftian I. eftablifhed a monaftic fociety with the badge of an elephant, which probably fuggefted to Frederick II. the idea of founding the order of the Elephant. He gave it away for the firft time on the third of May 1580. It was afterwards provided with new regulations by Chriftian V. on the firft of December 1693. The badge of this order is a white enamelled elephant furmounted with a caftle, fet in diamonds. The chain confifts of two elephants and two caftles alternately. It is worn, fufpended by a fky-blue watered ribbon, over the left fhoulder. The motto is: "Magnanimi pretium." On the left breaft the knights wear an octagon filver ftar. The number of the knights, befides the fovereign, is limited to thirty. It confers the title of excellency, and can be beftowed only upon perfons profeffing the proteftant religion. The fecond order of knighthood in Denmark is the Danebrog order. It derives its name from the once celebrated royal banner called the Danebrog, which was loft in the war with the inhabitants of Ditmarfh, a province of Holftein. It is reported to have been founded by Waldemar II. in 1219: but it is more probable that Chriftian V. was its real founder on the 12th of October 1671. The ftatutes of the order were only figned on the 1ft of September 1693. The badge of the Danebrog order is a white ribbon edged red, worn fcarf-wife over the right fhoulder, having at its end a fmall white enamelled crofs with diamonds. In the centre of this crofs are the letters W. for Waldemar, and C. V. for Chriftian V. with the royal crown, and underneath the word RESTITUTOR. The motto of the order is: "Teffera Fidelium." The knights wear an octagon filver ftar on the right breaft. Any perfon not of royal blood, who is to be made a knight of the Elephant, muft firft be a knight of the Danebrog, and have worn its badge at leaft for a few days. The number of knights was originally limited to 50; but in 1787 there were not lefs than 193 knights of the Danebrog.

The Danifh court was formerly very fplendid and expenfive: it is now one of the moft economical in Europe, though the number of perfons attached to the court be ftill very great. In 1783 there were 296 chamberlains, and 91 gentlemen of the bed chamber, 218 of whom had been appointed by Chriftian VII. The national theatre of Copenhagen is partly a royal eftablifhment.

The adminiftration of the kingdom is in the hands of a privy council, in which the king prefides. The number of its members is not limited. Subordinated to the privy council are the following five departments: 1. The Danifh chancery, which fuperintends the courts of juftice, ecclefiaftical affairs, public education, patents, privileges, &c. for Denmark and Norway. 2. The German chancery, which tranfacts the fame bufinefs for Slefwick and Holftein. 3. The department of foreign affairs. 4. The financial college or board of revenue; and, 5. The treafury. There is a minifter at the head of each of thefe departments.

The fundamental laws of Denmark are the royal law of 1665, which fixes the conftitution, and the law of the 15th of January 1776, called the Indigenate's Law, which excludes foreigners from public offices, unlefs they be naturalized. In civil and criminal matters, Denmark acknowledges no laws but the Danfke Low, or code of Chriftian III. publifhed in 1683. It has been often revifed, and a great many ftatutes have been added. An abridgement has been publifhed in Englifh under the title of "The Danifh Laws faithfully tranflated for the Ufe of the Englifh Inhabitants of the Danifh Settlements in America;" London, 1756, 8vo. in which the tranflator has omitted the fecond book, and the fections relating to the peafants. This Danifh code is concife, clear, and plain, and remarkable for its mildnefs and equity. Even lord Molefworth, who judges fo unfavourably of every thing Danifh, is reluctantly obliged to praife the Danifh code of laws. The courts of juftice are divided into three claffes, *viz.* the inferior courts, the fuperior courts, and the fupreme tribunal of Copenhagen. Inferior courts are in the country: 1. The herretfdinge, compofed of one judge, herretsfoget, and eight affeffors, chofen among the refpectable houfekeepers of the diftrict (herred), called ftokemen, befides a clerk called ding or herredfkriver. A herred, or diftrict, generally confifts of 40 or 50 parifhes. Thefe courts are held once a week. 2. The birkdinge, or courts of juftice on the eftates of the noblemen, which are not

not fubmitted to the jurifdiction of the herretfdinge. 3. The city jurifdictions, or byetinge, affifted by a certain number of affeffors chofen among the moft refpectable houfekeepers of the place, and called dingmen. At Copenhagen, however, all the inhabitants without diftinction are, fince 1771, under a feparate court, called the "Court and Town Jurifdiction," (Hof und Stadt Gericht) from which the appeal goes directly to the fupreme tribunal. But from all other inferior courts of juftice, the appeal firft goes to the fuperior courts, called landdinge, which are compofed of country judges, called landdommers, and are held once a month. The clerks are called landdingfherer. There are five landdinge in Denmark, one for Zealand, at Ringftædt; one for Funen and Langeland, at Odenfee; one for Jutland, at Wyborg; one for Laland and Falfter at Marieboe; and the fifth at Bornholm.

The fupreme tribunal of Copenhagen is the higheft court of juftice for all the Danifh dominions. It fits almoft the whole year, and is always opened with great ceremonies by the king himfelf in the beginning of March, on the ancient Herredag or Danehoev.

Although the adminiftration of juftice in the inferior courts is expeditious, and not very expenfive, yet in order to check the fpirit of litigation, too prevalent among the Danes, conciliatory committees have been annexed to the inferior courts of juftice fince the year 1795. See Copenhagen.

The police in Denmark is vigilant and good. A Board of Health (Medicinifche Collegium) watches over the health of the people, and has appointed a committee for promoting vaccination. (See Copenhagen.) But the moft interefting inftitution is the Lying-in Hofpital, where all midwives in the Danifh dominions muft have ftudied before they are allowed to exercife their profeffion. It is properly a kind of foundling hofpital, in which mothers may not only place their children, but where they may alfo be delivered. All pregnant women, of whatever condition, religion, or country they may be, are admitted without being afked any queftions; they are even allowed to come in mafks, and to continue mafked all the time they are there. The beft accommodations coft fifteen dollars *per* week. There are other apartments for twelve and eight dollars, that is about a guinea and a half. This interefting afylum is faid to have produced a vifible diminution in the number of infanticides, which the mild laws of Denmark rarely punifh with death. A Board of Alms (Pflege Anftalts Collegium) fuperintends the maintenance of the poor, who are fupported entirely by private charity. No beggars are feen on the road or in the ftreets. The number of charitable foundations in Denmark is very confiderable, and if the country offers few traces of opulence, it affords, however, no veftiges of poverty. The meaneft cottages are clean and comfortable. Denmark, though a proteftant country, has preferved feveral richly endowed ladies' convents, which afford an excellent education to the daughters of poor noblemen, and in which they find a comfortable afylum until they are married. The prifons are kept in the ftate recommended by the immortal Howard. See Copenhagen.

The revenues of the crown in Denmark arife chiefly,

1. From the demefnes and the quit-rents paid for thofe that have been fold.
2. From the Sound dues. See Elsineur.
3. From cuftom-houfe dues on exports and imports.
4. From the mines, mint, poft, and ftamp office.
5. From the land-tax, which varies in the different provinces, and is paid either for the fuppofed produce of the ground, or for the number of ploughs, as in Slefwick and Holftein, where each plough pays 5*l.* 12*s.* fterling annually. The duty paid by the faw-mills in Norway, is confidered as a branch of this tax. Every faw-mill pays 6*l.* fterling annually.
6. From the excife dues on wine, fpirits, beer, malt, cattle, leather, and feveral articles of food. It alfo includes the marriage-tax, confined to Copenhagen, where the higher ranks pay 10*l.* fterling on marrying. The tax comes gradually down as low as four fhillings.
7. From the tax on rank and honours. All the fubjects of the king of Denmark are claffed in nine different claffes. The firft pays annually 16*l.* fterling; the fecond 14*l.*; the third 8*l.*; the fourth 6*l.*; the fifth 3*l.* 4*s.*; the fixth 3*l.*; the feventh 2*l.* 8*s.*; the eighth 1*l.* 12*s.*; the ninth 1*l.* 4*s.*

Penfions of 80*l.* annually, or above, pay ten *per cent.*; from 70 to 80 exclufive, eight; from 60 to 70, feven; from 50 to 60, five; from 40 to 50, four; from 30 to 40, three; from 20 to 30, two. Widows pay half of the rank and penfion-tax.

8. From the poll-tax in Denmark Proper.
9. From the profits which the royal lotteries, eftablifhed at Copenhagen and Altona, leave to the crown. They are expofed to great variations. During fourteen years, *viz.* from 1773 to 1787, the gain of the crown amounted to 820 423*l.* fterling; but from 1787 to 1791, the public regained 403,672 fterling, leaving a balance of 416,751*l.* fterling, for the fpace of eighteen years. The average produce of this gambling impoft cannot, therefore, be valued at more than 20,000*l.* fterling, annually.
10. From the impofts levied in the Danifh Weft India iflands, which ufed to leave an annual clear revenue of about 30,000*l.* fterling.

On particular emergencies, extraordinary contributions are levied. Thus, on the 5th of January 1807, an additional tax of 1*l.* 4*s.* was laid on every plough, for defraying the expences attending the marching and quartering of the troops in Slefwick and Holftein.

The exact amount of the whole annual revenue of Denmark is not known. It may, however, be eftimated at eight millions of dollars, or 1,600 000*l.* fterling. In 1784, Mr. Coxe rated it at 1,400,000*l.*, but he acknowledges, in a note to the fifth edition, that it has fince been increafed. From 1785 to 1787, Mr. Tozc fuppofes it to have been 7,270,172 dollars or 1,440,000*l.* Profeffor Norman of Roftock, eftimated it in 1803, at 7,800,000 dollars, or 1,560,000*l.* fterling. The expenditure, which in former times frequently exceeded the receipts, had not only been made to balance of late years; but there was even a confiderable fum appropriated as a finking fund for the payment of the national debt, which had been reduced to little more than two millions and a half fterling. The perilous fituation in which Denmark has been recently placed, has caufed an iffue of exchequer bills, which it will be neceffary to fund, and which will no doubt raife the national debt again to what it was in the year 1790, namely, four millions fterling.

The military force of Denmark is partly mercenary, and partly a national militia. The former is on a regular eftablifhment, and continues in actual fervice all the year round. It is made up of foreign recruits, who coft the crown very large fums, but whofe number is not very great, and of national recruits, who enlift for a bounty.

The Danifh army is properly compofed of two diftinct corps, the Danifh and Norwegian troops, differing very much in their conftitution.

In Denmark each parifh (lage) furnifhes one foot foldier or cantonift, who receives common pay during the four weeks of exercife, an annual extra gratification of 1*l.* fterling,

ling, and four-pence for each Danish mile he has to travel to and from his regiment. Men above 36 years of age are free from the conscription. The horses for the cavalry are furnished by the land-owners, and country clergy for the cantonists, and kept by them for an annual gratification from the treasury. They may use these horses for their own personal service, but they must always keep them in good condition.

In Norway a lage, or district, furnishing a man, consists of two complete farms, and the whole army is composed of cantonists, without any regular troops. The time of service is fixed at nine years, at the end of which they are obliged, in case of need, to serve six years in garrison towns on the frontiers. The horses are found and kept by the land-owners, who may employ them to their own use. The annual exercises last only twelve days. The cantonists are exercised by companies, and every fourth year only by battalions.

The Danish regular troops receive new cloathing every third year, the national cantonists only every twelfth year. The pay of a common soldier is 3*d.* a day, that of a horseman $3\frac{1}{2}$*d.* with bread. Invalids are provided for in seven garrison companies, and in the hospital at Eckernforde. There is a school for one hundred cadets for the land service established at Copenhagen. Fifty are educated at the expence of government, and fifty on paying for their board. There are two other schools of the same kind, one at Christiania in Norway, and the other at Rendsburg in Holstein. In 1799, public lectures were instituted at Copenhagen for the instruction of non-commissioned officers.

The whole Danish army consists of 74,791 men, and costs annually 393,000*l.* sterling.

On the 19th of January 1801, a new national militia was organized by the name of *Landvaern.* It was to consist of those men, who, having attained their 36th year, are dismissed from the army, and they were to serve merely on emergencies, without being incorporated in the army. This service was to be limited to the age of 45. Two regiments of nearly 6000 men each were actually organized in the spring of 1801, when the English threatened the coast; and this auxiliary force has been lately called out and differently regulated. In the towns it extends to every male inhabitant capable of bearing arms.

The Danish fortresses are, Copenhagen, Cronenburg, Corsöer, Nyeborg, Fredericia, and Fladstrand in Denmark, Rendsburg and Gluckstadt in Holstein, Frederickshald, Aggerhuus near Christiania, Fredericksværn in Norway, and Vardoehus in Finmark. The principal arsenals are at Copenhagen, Rendsburg, Aggerhuus, and Frederickstadt. The war office is composed of a president and five assessors, and has under it three different departments for the cavalry, infantry, and the the fortresses.

According to the official Danish gazette of the 15th October, 1803, the Danish navy consisted at that time of 19 ships of the line, 15 frigates, 8 brigs, and 13 gun-boats. On the 1st of January 1807, the number of officers in the Danish fleet was 2 admirals, 2 vice admirals, 3 rear admirals, 10 commodores, 15 commanding captains, 25 captains, 30 captain-lieutenants, 55 first lieutenants, and 66 second lieutenants. But as the Danish navy has been entirely annihilated, we shall defer the account of every thing relating to this subject to the article NORWAY (which see), under which we shall also endeavour to state the external relations of Denmark, which are at this moment disturbed by the war.

With regard to the national character of the Danes, they have always been justly considered as a brave, generous, and grateful people, hospitable and enlightened, attached to their country, but rather slow, addicted to pleasure, intemperate in their food, litigious, and of an irascible and revengeful disposition. Coxe's Travels, vol. v. Fr. Thaarup's Statistik der Daenischen Monarchie, 1796. J. P. Catteau. Tableau des Etats Danois, 1802. C. G. Kuttner's Travels through Denmark in 1798 and 1799. Nord Litéraire, and Archives du Nord.

DENN, a town of Arabia, in the country of Yemen; 40 miles E. of Zebid. N. lat. 14° 15′. E. long. 43° 43′.

DENNEHOUT, a town of Flanders; 5 miles S. of Alost.

DENNIS, JOHN, in *Biography*, was the son of a sadler, and born in London in the year 1657. He received his grammar learning at Harrow school, and from thence he was admitted at Caius college, Cambridge. Here he remained several years, took his degree of M A., and then made the tour of France and Italy. Upon his return, he made himself known as a poet and dramatic writer; but neither in these departments, nor in political controversy, in which he engaged, did he make any distinguished figure. The public gave him little credit for real talents, and he was often disgusted and irritated that his labours were so ill received. As a critic he is best known; his violence in that character procured for him the appellation of "Dennis the Critic;" and his want of temper involved him in perpetual disputes with the principal writers of the day. Addison and Pope did not escape his lash; the latter retorted upon him with equal severity. Toward the close of life Dennis was much distressed in his circumstances. As a politician, he had ever espoused the whig party, and when his fortune, which had never been considerable, was reduced, he obtained, through the interest of the duke of Marlborough, a place in the custom house, which his wants or his extravagance obliged him in a few years to sell, reserving, however, an annuity for a certain term. This he outlived, and when he most needed the comforts of life he found himself completely destitute of every thing. To poverty was added the affliction of blindness. A play was acted at the Hay-market for his benefit, for which his old opponent, Pope, wrote a prologue, which would have been highly creditable to his candour, had he not taken the a[d]vantage of sneering at the man whom he professed to benefit. Dennis, at that period, was too old or too imbecile to be affected by this instance of disingenuity, which he survived but three weeks; he died on the 5th of Jan. 1734, in the 77th year of his age. In the Biographia Britannica we have a long account of the writings of Mr. Dennis, longer, perhaps, than would be thought necessary, by readers in general. Of this, the excellent writer, Dr. Kippis, seems aware, and apologizes, by saying, that the "article will not be found totally destitute of utility. It will add something to the great body of the literary history of England, and it may serve to display the unhappy effects that result from the extravagance of self-opinion; an extravagance which is usually more incident to secondary authors, than to those who occupy the highest ranks of genius and learning." Biog. Brit.

DENNIS, in *Geography*, a post town of America, in the state of Massachusetts, and county of Barnstaple, incorporated into a township in 1793; it is 80 miles S.E. from Boston, and 8 from Barnstaple, and contains 1408 inhabitants. This town comprehends the villages of Nobscusset, of 52 houses, and Suet of 36 houses.

DENNIS *Creek*, an American creek, in Cape May county, N. Jersey; 219 miles from Washington.

DENOMINATION, from *denomino*, of *de* and *nomen*, a name, a [na]me imposed on any thing usually expressing some quality predominant therein.

Hence, as the qualities and forms of things are of two kinds, *viz.* internal and external, denomination becomes twofold.

DENOMINATION, *internal*, is that founded on the intrinsic form; thus Peter is denominated learned on account of his learning, which is something internal.

DENOMINATION, *external*, is that founded on, or arising from, the external form. Thus, a wall is said to be seen and known, from the vision and cognition employed upon it; and thus Peter is denominated honoured, by reason of honour, which is not in the person honoured, but in him that honours.

DENOMINATOR, in *Arithmetic*, a term only used in speaking of fractions, or broken numbers. See FRACTION.

The denominator of a fraction is the number or letter below the line; shewing into how many parts the integer is supposed to be divided by the fraction.

Thus, in the fraction $\frac{7}{12}$ seven twelfths, the number 12 is the denominator, and shews that the integer is here divided in 12 parts. So in the fraction $\frac{a}{b}$, b is the denominator.

The denominator always represents an integer.

The number above the line, 7, is called the numerator.

DENOMINATOR *of a ratio* is the quotient arising from the division of the antecedent by the consequent.

Thus, 6 is the denominator of the ratio 30 : 5, because 5)30(6. The denominator is what we otherwise call the exponent of the ratio.

DE NON RESIDENTIA CLERICI REGIS, in *Law*, the name of an ancient writ, the form whereof see 2 Inst. fol. 624. for excusing a parson employed in the king's service for nonresidence.

DENS CANIS, in *Botany*, *Dog's Tooth violet*. See ERYTHRONIUM.

DENSCHENDORF, in *Geography*, a town of Denmark, in the island of Funen; 4 miles W. of Berg.

DENSHIRING, in *Agriculture*, a term formerly applied to the operation of paring off the surface of grass lands, and burning the materials thus produced by smothering fire. See PARING and BURNING.

DENS LEONIS, DANDELION. See LEONTODON.

DENSITY, (from the Latin *densitas*) closeness, or compactness. *Density* and *rarity* are opposite or relative terms, both referring to the quantity of matter contained in a given space. Take two vessels, A, and B, of equal capacities. Fill A loosely with cotton, and suppose it to contain one pound weight of cotton; let two pounds of cotton be forced into the vessel B; then the cotton in A is said to be rare with respect to the cotton in B, and the cotton in B is said to be dense with respect to the cotton in A. Also the density of the cotton in B is said to be double the density of the cotton in A, because it contains a double quantity of it in the like space; and if three pounds of cotton were forced into the vessel B, then the density of it would be treble that of the cotton in A, &c. So that the density is proportionate to the quantity of matter contained in a given space. It is evident, that if the capacity of the vessel B be double that of the vessel A, then, in order to produce in B a density of cotton double that of the cotton in A, four pounds of cotton must be forced into B; for if in this case the capacity of B be supposed to be divided into two parts, each part would be equal to A, and each part would contain two pounds of cotton. This explanation, which we have for the sake of perspicuity applied to the filling of vessels with cotton, must be applied to all other bodies of any other kind. Hence we learn the following evident and general deductions, or theorems, concerning the relative proportions of the densities, the bulks, and the weights of bodies.

I. The density is directly proportional to, or is as the quotient of the weight divided by the bulk.

II. The weight is as the product of the density multiplied by the bulk.

III. The bulk is as the quotient of the weight divided by the density.

If the density be called D, the bulk B, and the weight W; then these three theorems are, according to the algebraical notation, expressed in the following manner; ($\propto$ being the sign of constant proportion.)

$$\text{I. } D \propto \frac{W}{B}.$$
$$\text{II. } W \propto BD.$$
$$\text{III. } B \propto \frac{W}{D}.$$

Therefore, when two bodies, as M and N, are to be compared together with respect to their densities, weights, and bulks; call the density, weight, and bulk of M, respectively, D, W, B; also call the density, weight, and bulk of N, respectively, d, w, b; then the comparison for the above three cases stands thus:

$$\text{I. } D : d :: \frac{W}{B} : \frac{w}{b}.$$
$$\text{II. } W : w :: BD : bd.$$
$$\text{III. } B : b :: \frac{W}{D} : \frac{w}{d}.$$

One numerical application of the first case, will sufficiently illustrate the practical use of these theorems. Let the weight of the body M be 10 ounces, and its bulk five cubic inches; also let the weight of the body N be nine ounces, and its bulk three cubic inches, then the density of the body M is to the density of the body N, as $\frac{10}{5}$ is to $\frac{9}{3}$; or as two to three. In the preceding paragraphs we have taken it for granted, that the quantity of matter is proportionate to its weight; and, indeed, with bodies of the same kind of matter this can hardly be doubted; for instance, a lump of gold which weighs six pounds, must contain twice as much matter as is contained in another lump of gold which weighs three pounds. But with matter of different kind, it is impossible to say with certainty, that the weights are proportional to the quantities of matter. The weight of a body is measured by the force with which the substance of that body is attracted by the earth; therefore, if the attraction between the earth and a body A, be greater than the attraction between the earth and another body B, then those bodies may contain equal quantities of matter, and have unequal weights. But, in truth, we have no determinate knowledge of the real and intimate essence of matter. We distinguish matter, or bodies, by their properties; and it is impossible to say, whether matter consists of something essential and endowed with such properties, or it is only an assemblage of those properties. The most general idea is that, *cæteris paribus*, the quantity of matter is proportionate to its sensible weight; and in this we must for the present acquiesce.

The limits of density are likewise unknown to us. Air is one of the most elastic of the ponderable fluids known: and experiments shew, that a given quantity of air may be compressed into a space smaller and smaller, (and of course it may be rendered more and more dense) in proportion to the power which is applied to compress it; so that with a double

double force it may be contracted into half the ſpace; with a treble force, it may be contracted into a third part of the original ſpace, and ſo on: and human art has not been able to aſcertain how far this condenſation may be carried on. It has alſo been obſerved, that by removing the preſſure a quantity of air will be enabled to expand itſelf; nor has any limit been diſcovered to this expanſion. Other bodies are compreſſed, and become more denſe in conſequence of the application of an adequate force; but they do not follow the ſame regularity as air; nor do they recover their entire original bulk when the preſſure is removed. All metallic bodies, by preſſing, laminating, or hammering, may be permanently reduced into a ſmaller ſpace, or rendered more denſe; but it is not in our power to ſay how far their denſity may be increaſed.

The ſuſceptibility of condenſation ſhews, that the primitive particles of bodies cannot be in perfect contact with each other; but that they muſt contain a great many pores or vacuities. Indeed, ſir Iſaac Newton was of opinion, that even gold, which is the denſeſt body next to platina, is likely to contain more pores or vacuities than real ſolid matter. It is, however, to be obſerved, that this opinion is more verbal, than real; for when in common language we talk of pure gold, or pure ſilver, or pure water, &c. we mean that the gold or the ſilver is unmixed with other metals, or that the water contains no ſolid extraneous matter; but we forget, that the element of heat, or caloric, and the electric fluid are mixed with it. The firſt of theſe fluids is manifeſted by its being expelled in the act of hammering, or preſſing; as under that operation the metallic ſubſtance is unavoidably heated. The exiſtence of the electric fluid in conſiderable quantity is rendered more than probable by the phenomena of galvaniſm. See Galvanism. Upon this conſideration, therefore, a piece of pure gold, as we call it, is in reality a mixture of gold, caloric, and electricity. Hence, if the real particles of gold are not quite in contact with each other, they are kept apart by the other components of the mixed body, *viz.* by the caloric, and by the electric fluid. It ſeems, then, likely, that if we conſider the gold, the caloric, and the electric fluid as the component parts of the mixed body, which in common language we call pure gold, all theſe parts may be abſolutely in contact with each other. The conſequence of this concluſion would be, that the lump of this pure gold could not be compreſſed into a ſmaller ſpace, unleſs ſome of the ingredients are ſqueezed out of it; and this, in fact, takes place; for the caloric is expelled in the form of ſenſible heat whenever gold is compreſſed. The ſame reaſoning may be applied to all other kinds of compreſſible bodies; and it will be found, that thoſe which are more compreſſible, give out more heat. Thus the compreſſion of air produces heat ſufficient to ſet fire to light combuſtible bodies.

The denſities of bodies are alſo increaſed by cooling, or by the abſtraction of heat. This law, however, is not general; or rather, it does not obtain throughout the whole extent of the ſcale of heat. Water, for inſtance, becomes denſer and denſer by cooling, as far as about the 40th degree of Fahrenheit's thermometer; but below that degree the bulk of water is expanded by farther cooling; which is evidently owing to a cryſtallization, *viz.* to the particles of water diſpoſing themſelves in a peculiar order. The ſame thing, under certain limitations, has been obſerved in various other bodies.

The inveſtigation of the natural and acquired denſities of bodies has, at all times, and eſpecially of late, been particularly attended to by the moſt able philoſophers, as being a ſubject intimately connected with, and ſubſervient to, various important branches of natural philoſophy, and to the arts. The denſities of ſolids and fluids are, in fact, their ſpecific gravities, the knowledge of which every body knows to be extenſively uſeful. See Specific Gravity.

The mutual preſſure of fluids upon each other, alſo, of ſolids upon fluids, and *vice verſa*, which are of the utmoſt importance in hydraulics, in naval architecture, &c. is entirely dependent upon their peculiar denſities. See Hydraulics and Naval Architecture. In chemical operations, the denſities of fluids, and eſpecially of ſaline ſolutions, are carefully attended to: for the cryſtallization, and the ſeparation of ſalts, entirely depend upon the proper degree of denſity to which the brine is brought. See Chemistry, Salts, and Crystallization.

The inveſtigation of the various denſities of the atmoſphere at different times, and at different heights above the ſurface of the earth, enables us, beſides other uſes, to meaſure altitudes by the barometer.

With reſpect to the various denſity of the atmoſphere it will be neceſſary to give a general idea in this place, the more intricate part of it being treated of under the articles Atmosphere, Atmospherical Logarithmic, and Barometer.

Air actually taken in bottles, at different heights above the ſurface of the earth, (as far as human beings could aſcend,) and afterwards examined with all due precautions, has been found to be leſs denſe according as it was taken at a greater height. Alſo the numerous experiments that have been performed on the compreſſibility and elaſticity of the atmoſpherical air, prove, that by the application of preſſure, the air may be condenſed into a ſpace inverſely proportional to the force which is applied to it; that by removing the preſſure, the air expands in proportion to the quantity of preſſure which is removed; and by remaining a certain time under preſſure, the air loſes no part of its elaſticity. And to theſe properties we know no limits. Therefore, from all theſe facts we may ſafely conclude, that the air of the atmoſphere is denſeſt neareſt to the ſurface of the earth, where it is preſſed by the weight of the whole altitude of the atmoſphere; that it is leſs denſe according as the place is more diſtant from the ſurface, becauſe the ſuperincumbent air is leſs high; and laſtly, that it is impoſſible for us to ſay how far the atmoſphere is extended, becauſe we are not acquainted with the utmoſt limits of the air's expanſibility.

Beſides the compreſſion ariſing from the weight of the ſuperincumbent air, which undoubtedly is the principal cauſe of the various denſity of the atmoſphere; other cauſes concur in the production of that effect. In ſhort all the concurring cauſes are, as far as we know: 1. The various quantity of ſuperincumbent air at different altitudes; 2. The decreaſing attraction of the earth, or the decreaſing weights of bodies, in proportion to the ſquares of the diſtances from the centre of the earth; 3. The action of heat and cold; 4. The admixture of vapours and other fluids; and, 5. The attraction of the ſun and the moon.

From the abovementioned facts, the denſities, and of courſe, the preſſures of the atmoſphere, for different altitudes above the ſurface of the earth, are calculated on the ſuppoſition of the air's denſity, being affected only by the maſs or weight of the ſuperincumbent air; then, thoſe denſities are corrected according as the actual ſtate of the principal of the other concurring cauſes may ſeem to require. Laſtly, the barometer, by which we meaſure theſe denſities or preſſures at different altitudes, will of courſe, indicate the correſponding altitude. See Barometer, and the other articles above referred to.

DENSITY *of the Sun and Planets.* To determine the

 denſity

denfity of the fun and planets, is a problem in phyfical aftronomy, not more interefting from the information we derive from its refult, than from the nature of the method by which the folution is obtained.

To the antient mathematicians, who certainly were not deficient in their powers of reafoning, nothing could have appeared more completely out of the reach of human intellect, than to determine by the abftract properties of number or quantity, any thing relating to the internal ftructure of bodies, fo remote and inacceffible.—Confiderations of fome intricacy occur when we wifh to folve this problem, with the greateft exactnefs our data admit of;—but before we proceed to thefe computations, we would wifh to give fuch an explanation of the general nature of the method by which they are effected, as may be intelligible and fatisfactory to thofe who may not be familiar with the application of the Newtonian philofophy, to queftions of this nature.

The hypothefis, which it is neceffary to admit before we can attempt the folution of this problem, is that of univerfal gravitation. This fuppofes that all bodies (at leaft thofe in queftion) attract each other, in proportion directly to their maffes or quantities of matter, and inverfely as the fquares of their diftances. 1. This hypothefis is in fact nothing but the enunciation, in the form of theorem, of a very univerfally obferved phenomenon, and is by no means invalidated by the objections that have been made to it, that it endows matter with metaphyfical and occult qualities. When we fay that it is the nature of iron to be attracted by the magnet, we mean nothing more, than that every piece of iron on which the experiment has been made, has, without exception, obeyed the magnetic impulfe. The Newtonian hypothefis, on which all phyfical aftronomy is built, afferts nothing more of gravitation. In every cafe, as far as our obfervation reaches, the refult anfwers to the fuppofition. As it is not abfolutely impoffible, but that iron may exift which is not magnetic, fo in the regions of the univerfe, worlds may exift not fubject to the laws of attraction. Nor is that fpecies of attraction which we here confider any otherwife occult or metaphyfical, than as an agent, with whofe nature and mode of action we are at prefent entirely unacquainted. Its action is doubtlefs communicated through fome intermediate medium, and two bodies, in what we call free fpace, probably approach each other, becaufe it would require a greater effort in them to remain at reft, or to move in any other direction. When we fee a feather forcibly drawn to a piece of excited fealing wax, we attribute the phenomenon to the effect of the electric fluid, a name we have given, by analogy, to this extraordinary agent, whofe nature we know as little of, as of the nature of gravity, and which moft probably neither refembles a fluid, nor any other form of matter with which we are acquainted. But to return more immediately to the fubject—

We are now to fhew by what train of reafoning we arrive at the knowledge of the comparative quantity of matter which the fun and planets contain, relatively to that in the earth.

If a heavy body, for inftance a cannon ball, be fuffered to defcend from a ftate of reft, by no other impulfe than its own weight, it will fall towards the earth with a continually increafing velocity, and will defcribe about 16 feet in the firft fecond of time. This initial velocity of 16 feet in a fecond, may be taken as a ftandard meafure of the attractive power of the earth.

It is demonftrated by mathematicians, and we will here take it for granted, that the attractive force of a large fpherical mafs of matter will be the fame, let the dimenfions of the globe, into which that matter is compreffed, be what they may. So that if the whole mafs of the earth could be compreffed into a central point, its attractive force would remain the fame, and would at 4000 miles diftance, that is at the fame diftance as before, (4000 miles being equal to the earth's radius) caufe a heavy body to move towards it with an initial velocity of 16 feet in the firft fecond of time.

If we fuppofe the ball, inftead of defcending from a ftate of reft, to be projected horizontally from a cannon, it will ftill equally obey the attractive power of the earth, and will defcend exactly 16 feet from its horizontal direction in the firft fecond of time. If the earth were really compreffed into a fmall central fpace, as we juft now fuppofed, the ball would circulate round it, and would defcribe a curve, the nature of which would depend on the velocity of projection; but it would always have this property, that at the point of its origin, it would deviate from its tangent 16 feet in the firft fecond of time. If the ball be taken up 60 times as far from the centre of the earth, (namely to the diftance of the moon) the attractive power of the earth will then be diminifhed 3600 times, (3600 being the fquare of 60) becaufe the force decreafes, as the fquare of the diftance increafes; and the ball will defcend from a ftate of reft with an initial velocity of only the $\frac{1}{3600}$th part of 16 feet; and if it be projected as before, fo as to defcribe an orbit round the earth, that orbit would deflect from its tangent $\frac{16}{3600}$ feet. And in fact the moon itfelf is found to deflect this quantity from its tangent, which curious coincidence was the firft confirmation Newton obtained of the truth of his hypothefis.

If then we could find in our planetary fyftem, a fatellite or fecondary body, revolving round its principal in an orbit equally diftant from its centre, as the moon from the centre of the earth, we fhould eafily perceive whether that planet contained more or lefs matter than the earth, by obferving how much the orbit of the fatellite deflected from the tangent in one fecond of time. If the deflection was equal to that of the moon we fhould conclude, the mafs of the planet to be equal to that of the earth; if we found it greater or lefs, it would indicate the mafs of the planet to be greater or lefs in the fame proportion.

The planet Jupiter affords an obvious example to illuftrate this reafoning; its firft fatellite revolves round it at a diftance nearly equal to that of the moon from the earth, but in one fecond it deflects from its tangent 256 times as much as the moon does. The mafs of Jupiter is therefore 256 times greater than that of the earth. The principles of the calculation are not materially different for fatellites at different diftances, it is only neceffary to compute what the attractive power would be at equal diftances. The mafs of a planet being thus found, and its magnitude determined by obfervation, its relative denfity may be computed according to the principles defcribed in the former part of this article.

We fhall now proceed to explain the practical methods that are ufually employed for the folution of this problem—

It has been before ftated, that if of thefe three things, namely, the magnitude, the mafs, and the denfity of a body, any two be given, the other may be found. The magnitudes of the fun and planets are here fuppofed to be determined by obfervation; to afcertain their denfities, we begin by computing their maffes.

The mafs of a planet may be computed by comparing the velocity in its orbit round the fun, either with the velocity of its fatellite, or with the force of gravity at its furface. If the planet has no fatellite, aftronomers have recourfe to a method much lefs accurate, depending on the effect which

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by obfervation the planet is found to produce in difturbing the motions of the other planets. For the determination of the denfity of Mercury, La Place prefers deducing it from analogy, by obferving the law of the denfities of the reft of the planets relatively to their diftances from the fun; but it muft be acknowledged, that fuch determination is little better than mere conjecture.

The firft of the above methods is founded upon a theorem, derived from the doctrine of central forces.

Let F reprefent the attractive force of the fun,

T the periodic time of the planet, whofe mafs we wifh to determine,

r the radius of the obit of the planet,

r' the radius of the orbit of the fatellite.

F′, the attractive force of the planet upon its fatellite.

T′, the periodic time of the fatellite.

M, the mafs of the fun.

M′, the mafs of the planet.

It will then appear that $M : M' :: \frac{r^3}{T^2} : \frac{r'^3}{T'^2}$.

For by the principles of central forces,

$$F : F' :: \frac{r}{T^2} : \frac{r'}{T'^2};$$

and fince we fuppofe the attractive force of the planet upon its fatellite to vary inverfely, as the fquare of the diftance

$$F' : f :: r^2 : r'^2.$$

Multiplying thefe two proportions, and dividing by F′,

$$F : f :: \frac{r^3}{T^2} : \frac{r'^3}{T'^3};$$

but $F : f$, are the attractive forces of the fun and planet, upon a particle of matter, placed at equal diftances, and are evidently proportionate to the maffes. Therefore, $M : M' :: \frac{r^3}{T^2} : \frac{r'^3}{T'^2}$.

Example.—To find the mafs of Jupiter.

$$r : r' :: 63662 : 7964.7,$$
$$T : T' :: 365.256 : 16.689.$$

Therefore $M : M' \frac{(63662)^3}{(365\ 256)^2} : \frac{(7964.7)^3}{(16.689)^2} :: 1 : \frac{1}{1066.08}$.

But, as the force which retains Jupiter in its orbit, is the fum of the attractions of Jupiter and the fun, the denominator muft be increafed by unity, and the mafs of Jupiter will be $\frac{1}{1067\ 08}$.

In the fame manner, La Place finds Saturn $\frac{1}{3359.4}$.

The Georgian $\frac{1}{19504}$.

The fecond method confifts in determining the diftance which a planet (as the earth) deflects from its tangent in one fecond, by comparing its angular velocity, with the mean radius of its orbit; and having found by experiment the fpace which a heavy body defcribes in one fecond by the force of gravity at the furface of the planet, we can compute the fpace it would fall through in the fame time, if removed to the diftance of the fun, and fince at equal diftances the attractive force is proportionate to the maffes, we can deduce the ratio of the maffes from that of the attractive forces. By this method the mafs of the earth is found to be $\frac{1}{329630}$ that of the fun.

The maffes of Venus and Mars have been eftimated by the fecular variation which thofe bodies produce on the folar fyftem. La Place concludes the mafs of Mars $\frac{1}{1846082}$, and that of Venus $\frac{1}{383137}$, the fun being unity. Thefe quantities were obtained by the fecular diminution of the obliquity of the ecliptic, and from the acceleration of the mean motion of the moon.

The denfities of fpherical bodies are, as their maffes, divided by the cubes of their femi-diameters.

The diameters of the planets being found by obfervation, and their maffes by the above methods, the denfities of the planets appear to be as follows:

Sun	1.0000
Earth	3.9393
Jupiter	0.8601
Saturn	0.4951
Georgian	1.1376

Mr. Vince, in his Aftronomy, gives us the following method of finding the denfities of the planets:

Put $d =$ the denfity of the central body,

$m =$ its diameter,

$a =$ its quantity of matter,

P = the periodic time of the revolving body,

D = the mean diftance of the revolving body from its central body,

S = the fine of the angle under which m appears at the diftance D, to radius unity.

Then a varies as dm^3, but P^2 varies as $\frac{D^3}{a}$, which varies as $\frac{D^3}{d\,m^3}$, hence d varies as $\frac{D^3}{m^3\,P^2}$. But $S = \frac{m}{D}$; hence d varies as $\frac{1}{S^3\,P^2}$, we will therefore affume $d = \frac{1}{S^3\,P^2}$.

For the fun.—If we take the earth as the revolving body, P = 365, 25639 days, according to M. de la Caille $s =$ 0.0093155 = fin. 32′, 1″, 5, the mean apparent diameter of the fun, hence $d = \frac{1}{0.0093155^3 \times 365.25639^2} =$ 9.2722.

For the earth.—Here we muft take the moon for the revolving body, therefore P = 27.32167 days according to Mayer, S = 0.033155 = fin. 1° 54′, the mean angle under which the earth's mean diameter appears at the moon, hence $d = \frac{1}{0.033155^3 \times 27.32167^2} = 36.7569$.

For Jupiter.—Mr. Pound has obferved the greateft elongation of its fourth fatellite to be 8′ 16″, and the correfponding diameter of Jupiter to be 39″, hence the fine S of the angle under which the diameter of Jupiter appeared at that fatellite at that time was 0.07869. Alfo P = 16.68898 days, according to M. Wargentin; hence $d = \frac{1}{0.078629^3 \times 16.68898^2} = 7.3857$.

For Saturn.—According to Mr. Pound, the greateft elongation of its fourth fatellite is 2′ 58″, and the correfponding diameter of Saturn = 18″; hence S = 0.10112. Alfo P = 15.9454 days, according to Dr. Halley, hence $d = \frac{1}{0.10112^3 \times 15.9454^2} = 3.8038$.

For the Georgian.—If we take the fecond fatellite, we have, according to Dr. Herfchel, its greateft elongation = 44″.23, and the correfponding diameter of the planet =3″.90554,

$= 3''.90554$, hence $S = 0.0883$. Alfo $P = 13.462$ days, hence $d = \dfrac{1}{0.0883^3 \times 13.462^2} = 8.0149$.

The denfity of Venus was computed, by Dr. Mafkelyne, to be 1.024. M. de la Lande makes it 1.038.

The denfities of the planets, determined by this method, will be nearly as follows:

Sun	0.25226
Mercury	2.58330
Venus	1.02400
Earth	1.00000
Mars	0.65630
Jupiter	0.20093
Saturn	0.10349
Georgian	0.21805

Denfity of the Earth.

In the above computations, the fun or the earth hath been affumed as the unity, from which the other denfities have been computed.

But it is a queftion of no lefs intereft to know the denfity of the earth itfelf, relatively to fome known fubftance, for inftance, water, which is what we ufually take as a ftandard of comparifon, when we confider the fpecific gravities of other bodies.

Dr. Mafkelyne, the prefent aftronomer royal, was the firft perfon that determined experimentally the denfity of the earth by meafuring the attractive force of the mountain Schehallien, on the plumb-line of a zenith fector. He inferred the actual mean denfity of the earth to that of water as $4\frac{1}{2}$ to 1. The data for this determination were fomewhat uncertain, as it was requifite to have given the internal ftructure of the mountain, which could not be known but by conjecture.

But the late experiments of Mr. Cavendifh have left us very little uncertainty upon this fubject; he concludes the mean denfity of the earth to be $5\frac{1}{2}$ greater than water.

The experiment of Mr. Cavendifh is founded on the fame principle as that of Dr. Mafkelyne; the reader willfind a very minute defcription of every part of the procefs in the Philofophical Tranfactions, for 1798, from which we can only give an extract of the more material circumftances. To render the object of the experiment more intelligible, it may not be improper to give a fhort explanation of the principle on which it is founded.

If a ball a (*Plate* IX. *Aftronomy*, *fig.* 60.) be fufpended by a thread in the manner of a pendulum, and a large ball A, be placed on one fide of it, if the attraction of A be fenfible on the fmaller ball, it will be deflected from its vertical pofition and will affume a new one, as $\acute{a}$, where it will remain in equilibrio. And as it is demonftrated by the elementary principles of mechanics, that the attractive power of the ball A is to the attractive power of the earth as the arc $a\acute{a}$ is to radius: therefore when we know the attractive power of 100 weight of lead, for inftance, at the diftance Aa, we can calculate how many hundred weight muft be placed at 4000 miles diftance, or at the centre of the earth; to retain the ball in equilibrio at $\acute{a}$, this weight is evidently that of the whole earth. Now to render the fmall arc $a\acute{a}$ fenfible, it is evident we muft either have a pendulum of an exceffive length, or the ball A of an enormous weight.

In Dr. Mafkelyne's experiment the latter circumftance was chofen. The mountain reprefented the ball A, and the pendulum was the plumb-line of the zenith fector; the former principle is adopted in that of Mr. Cavendifh, and the ingenuity of the mechanifm confifts in the fubftitution of a fhort horizontal pendulum, equal in fenfibility to a vertical one of immenfe length: for we fhall find that the pendulum in the following experiments, vibrated only four times in an hour: now a pendulum fufpended vertically to have vibrated equally flow, and to have been therefore equally fenfible to the attraction of the ball A, muft have been between four and five hundred miles in length.

The apparatus confifts of a flender horizontal arm, about fix feet long, having at its extremities two fmall leaden balls of two inches diameter; this is fufpended by a fine wire 40 inches long, the whole inclofed in a narrow wooden cafe to defend it from wind. It is plain that if the wire is fufficiently flender, a very minute force will be fufficient to draw the balls on one fide: for when left to themfelves they will affume a given pofition, in which they will remain at reft, and upon being flightly deranged will vibrate, and their vibrations will be the quicker, as the tendency of the rod to affume a given pofition, is greater, which will entirely depend on the rigidity of the wire.

Small pieces of ivory, containing divifions to the 20th parts of an inch are placed within the cafe; thofe in the direction $a\,a''$, $b\,b''$, confidered as plus; thofe in the direction $a\,a'$, $b\,b'$, minus.

Two leaden weights about 508 *oz.* each, are brought by means of an apparatus without the cafe, into either of the pofitions W W, or $w\,w$, or they may be kept at right angles to the arm, in which cafe they have no tendency to produce motion in the fmall balls a or b.

The object of the experiment is, next, to determine the time of the vibrations of the arm, and the angular deviation from its central pofition caufed by the attraction of the leaden weights. The author, after defcribing the apparatus, proceeds to give the minute detail of 17 fets of experiments, of which the refults were as follows:—

Experiments	Motion of Weight.	Motion of the Arm.	Ditto cor^d.	Times of Vibration.	Ditto cor^d.	Mean Denfity of the Earth.
1	o to +	14.32	13.42			5.5
	+ to o	14.1	13.17	14.55		5.61
2	o to +	15.87	14.69			4.88
	+ to o	15.45	14.14	14.42		5.07
3	+ to o	15.22	13.56	14.39		5,26
	o to +	14.5	13.28	14.54		5.55
4	o to +	3.1	2.95		6.54	5.36
	+ to −	6.18		7.1		5.29
	− to +	5.92		7.3		5.58
5	+ to −	5.9		7.5		5.65
	− to +	5.98		7.5		5.57
6	o to −	3.63	2.9			4.53
	− to +	5.9	5.71			5.62
7	o to −	3.15	3.03			5.29
	− to +	6.1	5.9	7.4		5.44
8	o to −	3.13	3.00	by mean	6.57	5.34
	− to +	5.72	5.54			5.79
9	+ to −	6.32		6.58		5.1
10	+ to −	6.15		6.59		5.27
11	+ to −	6.07		7.1		5.39
12	− to +	6.09		7.3		5.42
13	− to +	6.12		7.6		5.47
	+ to −	5.97		7.7		5.63
14	− to +	6.27		7.6		5.34
	+ to −	6.13		7.6		5.46
15	− to +	6.34		7.7		5.3
16	− to +	6.1		7.16		5.75
17	− to +	5.78		7.2		5.68
	+ to −	5.64		7.3		5.85

For the method of computing the denfity of the earth from thefe data, we fhall give the author's own words.

"I fhall firft compute this on the fuppofition that the arm and copper rods have no weight, and that the weights exert no fenfible attraction, except on the neareft ball, and fhall then examine what corrections are neceffary on account of the arm and rods, and fome other fmall caufes.

"The firft thing is to find the force required to draw the arm afide, which, as was before faid, is to be determined by the time of a vibration.

"The diftance of the centres of the two balls from each other is 73.3 inches, and therefore the diftance of each from the centre of motion is 36.65, and the length of a pendulum vibrating feconds in this climate is 39.14. Therefore if the ftiffnefs of the wire by which the arm is fufpended is fuch that the force which muft be applied to each ball, in order to draw the arm afide by the angle A, is to the weight of the ball as the arc of A to the radius, the arm will vibrate in the fame time as a pendulum whofe length is 36.65 inches, that is in $\sqrt{\frac{36.65}{39.14}}$ feconds; and therefore if the ftiffnefs of the wire is fuch as to make it vibrate in N feconds, the force which muft be applied to each ball, in order to draw it afide by the angle A, is to the weight of the ball as the arc of $A \times \frac{1}{N^2} \times \frac{36.65}{39.14}$ to the radius. But the ivory fcale at the end of the arm is 38.3 inches from the centre of motion, and each divifion is $\frac{1}{20}$th of an inch, and therefore fubtends an angle at the centre, whofe arc is $\frac{1}{766}$; and therefore the force which muft be applied to each ball, to draw the arm afide by one divifion, is to the weight of the ball as $\frac{1}{766N^2}\,\frac{36.65}{39.14}$ to 1, or, as $\frac{1}{818N^2}$ to 1.

"The next thing is to find the proportion which the attraction of the weight on the ball bears to that of the earth thereon, fuppofing the ball to be placed in the middle of the cafe, that is, not to be nearer to one fide than the other. When the weights are approached to the balls, their centres are 8.85 inches from the middle line of the cafe; but through inadvertence, the diftance from each other of the rods which fupport thefe weights, was made equal to the diftance of the centres of the balls from each other, whereas it ought to have been fomewhat greater. In confequence of this, the centres of the weights are not exactly oppofite to thofe of the balls when they are approached together; and the effect of the weights in drawing the arm afide, is lefs than it would otherwife have been in the triplicate ratio of $\frac{8.85}{36.65}$ to the chord of the angle, whofe fine is $\frac{8.85}{36.65}$, or in the triplicate ratio of the cofine of half this angle to the radius, or in the ratio of .9779 to 1.

"Each of the weights weighs 2,439,000 grains, and therefore is equal in weight to 10.64 fpherical feet of water. And therefore its attraction on a particle placed at the centre of the ball, is to the attraction of a fpherical foot of water, on an equal particle placed on its furface, as $10.64 \times .9779 \times \left(\frac{6}{8.85}\right)^2$ to 1. The mean diameter of the earth is 41800000 feet, and therefore if the mean denfity of the earth is to that of water as D to 1, the attraction of the leaden weight on the ball will be to that of the earth thereon, as $10.64 \times .9779 \times \left(\frac{6}{8.85}\right)^2$ to 41800000 D :: 1 to 8739000 D.

"It is fhewn therefore, that the force which muft be applied to each ball, in order to draw the arm one divifion out of its natural pofition, is $\frac{1}{818N^2}$ of the weight of the ball; and if the mean denfity of the earth is to that of water, as D to 1, the attraction of the weight on the ball is $\frac{1}{8739000\,D}$ of the weight of that ball: and therefore the attraction will be able to draw the arm out of its natural pofition by $\frac{818\,N^2}{8739000\,D}$, or $\frac{N^2}{10683\,D}$ divifions: and therefore, if on moving the weights from the midway to a near pofition, the arm is found to move B divifions, or if it moves 2 B divifions, on moving the weights from one near pofition to the other, it follows that the denfity of the earth, or D, is $\frac{N^2}{10683\,B}$."

The remaining part of the paper of Mr. Cavendifh is filled with the calculations neceffary to find the corrections which are added to the table of experiments.

Thefe being applied, and a mean taken of all the experiments, the author concludes the mean denfity of the earth to be 5.48 times greater than that of water.

DENTAL, Dentalis, from *dens*, a *tooth*, is applied to certain letters, in the pronunciation whereof the teeth have a principal fhare.

Grammarians, and efpecially the Hebrew ones, diftinguifh the letters into dental, labial, guttural, lingual, palatal, &c.

DENTALIS, in *Anatomy*, a term which has been applied to the nerves and blood-veffels of the teeth.

DENTALIUM, in *Conchology*, a genus of univalves of a tubular form, ftraight or only flightly curved, with an undivided cavity open at both ends. Animal a terebella.

Species.

Elephantinum. Shell with ten ribs, flightly curved and ftriated. Linn.—*Denticulus elephanti*, Rumpf.—*Dentalis*, Argenv.

Inhabits the Indian and European feas, and is about four inches long; the fhell is deeply grooved, green with the tip white.

Aprinum. Shell with ten ribs, flightly incurved and fmooth. Mart.

Native of the fame feas as the former, and is by fome confidered as a variety.

Arcuatum. Shell ribbed, curved, fubulate, and of one colour. Gualt. Country unknown; colour greenifh.

Striatulum. Shell with eight ribs and eight ftriæ; tip acute, green and tipped with white. Mart. Native of the Sicilian feas.

Sexangulum. Shell with fix ribs and ftriated. Schroet. Difcovered in a foffil ftate at Loretto.

Dentalis. Shell with twenty ftriæ, flightly curved and interrupted. Rumpf.

Found in the Mediterranean, and is fometimes red, or reddifh at the tip.

Entalis. Shell round, flightly curved, continued and fmooth. Linn. Donov. Brit. Shells, &c. Native of European fhores; about an inch and half in length.

Arietinum. Shell round, curved, continued, and fmooth. Müll.

Inhabits the ſhores of Scandinavia; reſembles the laſt, but is much ſmaller.

Corneum. Shell round, ſlightly curved, interrupted and opake. Schroet.

Length an inch and a quarter. This ſhell is ſmooth, horny, yellowiſh brown, with an obtuſe rounded tip, and inhabits the African ocean.

Politum. Shell round, ſlightly curved, continued, and marked with crowded annular ſtriæ. Gualt.

Native of Indian and European ſeas, and meaſures about an inch and a half in length.

Eburneum. Shell round, ſlightly curved, continued, and marked with remote annulations. Gmel. Inhabits the ſame country as the former.

Minutum. Shell round, ſtraightiſh, ſmooth, and minute. Plancus. Native of the Mediterranean.

Fasciatum. Shell very finely ſtriated, ſlightly curved, and grey, with darker bands. Martini.

Inhabits Sicily. This ſhell is minute, ſolid, and marked with about four or five duſky cinereous or fuſcous bands.

Nebulosum. Shell arcuated, very ſmooth and white, ſpotted and clouded with fulvous. Gmel. Native of the Sicilian ſeas.

Rectum. Shell ſtraight, with double or triple ſtriæ, and annulated. Gualt. Country unknown.

Fossile. Shell roundiſh, and ſomewhat obtuſe, with very fine equal ſtriæ. Schroet. Found foſſil near Loretto.

Annulatum. Shell round and obliquely ſtriated. Guettard. Occurs in a foſſil ſtate.

Radula. Shell ſomewhat arched and rather obtuſe, with decuſſate ſtriæ, the longitudinal ones granulated. Schroet. Found in the ſame ſtate as the former in Piedmont. Length one inch.

Pellucidum. Shell horny, flexile, ſtraightiſh, round and ſmooth. Schroet.

Native of the Northern ſeas. The length is two inches and a quarter; colour pale honey.

Interruptum. Shell with decuſſating ſtriæ, all which are ſmooth; the longitudinal ſtriæ with finer interrupted ones. Schroet.

This and the following are found in a foſſil ſtate in Piedmont.

Vitreum. Shell hyaline, very glabrous and ſubarcuated. Schroet.

DENTARIA, in *Botany*, (from the toothed ſtructure of the root, whence it has been ſuppoſed, without any real foundation, to be uſeful in diſorders of the teeth.) Tooth-wort, or Coral-wort, Linn. Gen. 337. Schreb. 441. Willd. Sp. Pl. v. 3. 478. Juſſ. 239. Claſs and order, *Tetradynamia Siliquoſa*. Nat. Ord. *Siliquoſæ*, Linn. *Cruciferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of four leaves, which are ovate-oblong, cohering longitudinally, obtuſe, deciduous. *Cor.* cruciform. Petals four, roundiſh, obtuſe, ſcarcely emarginate, flat, with claws as long as the calyx: nectary four glands at the baſe of the germen. *Stam.* Filaments ſix, awl-ſhaped; four of them as long as the calyx, two ſhorter; anthers oblong-heart-ſhaped, erect. *Piſt.* Germen oblong, the length of the ſtamens; ſtyle very ſhort and thick; ſtigma obtuſe, emarginate. *Peric.* Pod long, round, of two cells and two elaſtic valves, which roll back when ripe; partition a little longer than the valves. *Seeds* numerous, ſomewhat ovate.

Eſſ. Ch. Pod burſting elaſtically, the valves rolling back, ſhorter than the partition; ſtigma emarginate; Calyx-leaves cohering longitudinally.

Seven ſpecies are deſcribed in Willdenow; three only were known to Linnæus. The roots of all, as far as we are informed, are perennial, fleſhy, white, notched in ſuch a manner as to reſemble the human fore teeth. Stem ſimple, herbaceous. Leaves compound, ſerrated, ſmooth. Flowers in a terminal corymb, purpliſh, or white, large and handſome, reſembling thoſe of *Lunaria* or Honeſty. 1. D. *enneaphylla*. Linn. Sp. Pl. 912. Jacq. Auſtr. t. 316. Leaves three together, ternate, ſerrated, without any glands between the leaflets. A native of Auſtria and Italy, in mountainous ſtony places. Flowers pale yellowiſh. 2. D. *glanduloſa*. "Leaves three together, ternate, deeply toothed, with an awl-ſhaped gland between their leaflets. Stamens half as long as the corolla." Willd. Sp. Pl. v. 3. 478. Found by Waldſtein and Kitaibel in Hungary, and diſtinguiſhed by Willdenow from the former. Flowers purple, larger. Leaves narrower. 3. D. *laciniata*. Willd. 479. Leaves three together, ternate, bluntiſh, toothed; lateral leaflets deeply divided. This, a native of Pennſylvania, was originally ſent by Kalm to Linnæus, who took it for his own D. *pentaphyllos*, a ſpecies he had adopted from authors without ſeeing it, but which is a very different and much larger plant. 4. D. *bulbifera*. Bulbiferous Coral-wort. Linn. Sp. Pl. 912. Engl. Bot. t. 309. Lower leaves pinnate; upper ones ſimple. A native of ſome places in the middle and ſouth of England, as at Harefield, Beaconsfield, Tunbridge, &c. but a doubtful Swiſs plant. Known by ſcaly purple *gemmæ* or buds produced in the boſoms of its leaves, by which it is propagated like the *Lilium bulbiferum*, and like that it conſequently ſeldom perfects ſeed. 5. D. *microphylla*. "Leaves all pinnate; leaflets linear-lanceolate, unequally toothed. Willd. 479. Known only by Willdenow's account, who had it from Siberia, and compares its leaves to the *Cardamine*, v. 3. t. 65. of Gmelin's Sib. Flowers purple, but with narrower petals than in the following, of which Willdenow ſuſpects it may be a variety. 6. D. *pinnata*. Lamarck Encycl. v. 2. 268. Ait. H. Kew. v. 2. 386. Willd. 480. (D. pentaphylla α, Linn. Sp. Pl. 912. D. heptaphyllos. Cluſ. Pann. 453. Garid. Prov. t. 28. Ger. em. 985. Geſn. Faſc. t. 1. f. 2.) Leaves all pinnate; leaflets lanceolate, pointed, acutely ſerrated. Found in the Alps of France and Switzerland. A very large and handſome ſpecies, confounded by Linnæus and Haller with the following. The flowers are uſually of a light roſe-colour. 7. D. *pentaphylla*. Linn. Sp. Pl. 912, β and γ. Willd. 480. Leaves digitate; leaflets five. Of this there are two ſuppoſed varieties, both natives of the Alps of Switzerland. The β of Linnæus is Dentaria 7, Cluſ. Hiſt. v. 2. 122. f. 2; (Geſn. Faſc. t. 1. f. 1, B; Camer. Epit. 704.) This has the root very remarkably and acutely toothed, and the leaves are ſaid to be ſmooth. The γ of Linnæus is Dentaria 6, Cluſ. Hiſt. v. 2. 122. f. 1; (Geſn. Faſc. t. 1. f. 1, A; Bauh. Hiſt. v. 2. 901.) In this the root is rather knotty and as it were jointed, *nodoſo-articulata*, than toothed, and the leaves are deſcribed rough to the touch. Garidel's tab. 29, though taken by him for the former, appears by the root to be this variety. There is the greateſt reaſon to believe theſe two diſtinct ſpecies, though ſince Caſpar Bauhin united them, no botaniſt has ſeparated them, nor have we materials ſufficient for the purpoſe. They deſerve the attention of the curious botaniſt, and are worthy of a place in our gardens.

Dentaria. See Lathræa, Tozzia, and Orobanche.

Dentaria, in *Gardening*, affords plants of the herbaceous flowery, hardy, perennial kind; of which the ſpecies cultivated

cultivated are the five-leaved dentaria, or tooth-wort (D. *pentaphylla*), bulbiferous dentaria, or coral-wort, (D. *bulbifera*.)

The firft fort rifes with a ftrong ftalk a foot and a half high, with a leaf at each joint, compofed of five lobes, four inches long, and near two broad in the wideft part, ending in acute points, and deeply ferrate; they are fmooth, and ftand on long foot-ftalks; the flowers grow in loofe fpikes at the top of the ftalks, are fmall, and of a blufh colour. It is a native of Switzerland, &c.

The fecond kind has a perennial root: the ftem is fimple, a foot in height; the lower leaves have three pairs of leaflets, and an odd one, which is confluent with the pair below it; they are bluntly lanceolate and ferrate; the leaves above thefe have five leaflets, and the upper leaves are trifid or fimple, acutely lanceolate, ferrate; the flowers are in clufters on the tops of the ftalks, and flefh-coloured or purple. The fcaly bulbs in the axils of the upper leaves, falling off, take root, and propagate new plants; fo that it rarely produces feed. It is a native of Sweden, flowering in April and May.

Method of Culture.—In thefe plants the propagation is effected by fowing the feeds in a light fandy foil, where the fituation is fhaded, either in the autumn, as foon as they are perfectly ripened, or in the early fpring. The former is the better feafon, where the foils are fufficiently dry. They are alfo capable of being increafed by parting the roots and planting them out, where there is a due degree of moifture and fhade, in the autumn or fpring; and in the latter fort they may be raifed by planting the bulbs produced on the fides of the ftems.

Afterwards, the only culture the plants ftand in need of, is that of keeping them clean from weeds, and in the firft method removing fuch plants as may be too much crowded to proper fituations in the fpring. They moftly flower and produce feeds in the fecond year's growth.

Thefe are a fort of plants which are well adapted to the borders and other parts of fhady walks, and other fimilar compartments; where they grow well, and have an ornamental effect, as well as afford variety.

DENTATA Vertebra, in *Anatomy*, the fecond vertebra of the neck; fo called from a peculiar procefs, which it poffeffes. See Spine.

DENTATUM Folium. See Leaf.

DENTED, Indented, *toothed*. See Indented.

Dented *Wheel*, in *Mechanics*. See Wheel.

DENTELLA, in *Botany*, (in allufion to the minute teeth of the corolla, on which the generic character is founded.) Forft. Gen. 13. t. 13. Schreb. 124. Willd. Sp. Pl. v. 1. 972. Juff. 200. Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Rubiaceæ*, Juff.

Gen. Ch. *Cal.* Perianth fuperior, in five deep awl-fhaped fegments. *Cor.* of one petal, funnel-fhaped, longer than the calyx; tube gradually dilated upwards; limb regular, in five equal fpreading fegments, each of them with three acute teeth, the middle one of which is the longeft. *Stam.* Filaments five, equal, fhort, awl-fhaped, inferted into the bafe of the tube; anthers oblong, erect. *Pift.* Germen inferior, roundifh, hairy; ftyle cylindrical, fhort, and thick; ftigmas two, fpreading, obtufe, longer and thicker than the ftyle. *Peric.* Capfule globofe, of two cells, crowned with the calyx. *Seeds* feveral, ovate.

Eff. Ch. Calyx fuperior, in five deep fegments. Corolla funnel-fhaped, in five fegments, each with three teeth. Capfule of two cells, with many feeds.

The only known fpecies is D. *repens*; Forft. Prod. 17. Willd. Sp. Pl. v. 1. 972. (Oldenlandia repens; Linn. Mant. 40. Burm. Ind. 38. t. 15. f. 2, very bad, with an erroneous fynonym from Hort. Mal. v. 10. t. 31. Alfine fpergula ind. or. &c.; Pluk. Amalth. 10. t. 356. f. 5. Crufta ollæ minima; Rumph. Amboin. v. 6. 460. t. 170. f. 4, good.) A native of various parts of the Eaft Indies; found by Forfter in New Caledonia. It is faid by Rumphius to be a weed in the gardens of Amboyna, and by Burmann to grow in wet places at the coaft of Coromandel. Root annual, according to Burmann. Stems feveral, proftrate, branched, leafy, fquare, fmooth, taking root at their joints. Leaves oppofite, ftalked, elliptic-lanceolate, entire, fmooth, refembling thofe of thyme. Flowers axillary, folitary, nearly feffile. Corolla rather longer than the leaves, flender, white, often with a purplifh tinge. Capfule nearly globular, the fize of a pepper-corn, clothed all over with prominent, jointed, obtufe, pellucid hairs, which render it very confpicuous and remarkable. The plant is not known in our gardens, nor has it been found of any ufe.

DENTELLARIA. See Plumbago *Europæa*.

DENTES, in *Anatomy*. See Cranium and Teeth.

Dentes *lactei*, or *decidui*, the firft, or temporary fet of teeth; for an account of which, fee Cranium.

DENTEX, in *Ichthyology*, a fpecies of *Sparus*; which fee.

DENTICI, Luigi, in *Biography*, a Neapolitan gentleman, who publifhed at Rome, in 1553, two dialogues on mufic. Of thefe, though the fubject turns chiefly upon the mufical proportions, and modes of the ancients, in attempting to explain which, Boethius feems to have been the author's principal guide; yet, in the fecond dialogue, we have an account of what was then a *modern* concert, from which an idea may be formed of the ftate of practical mufic at Naples, when this book was written. One of the interlocutors, fpeaking with rapture of a performance which he had heard at the palace of Donna Giovanna d'Arragona, tells us that the principal muficians who played on inftruments, and were of the firft clafs, were Giovan Leonarda de l'Harpa Napolitano, Perino da Firenze, Battifta Siciliano, and Giaches da Ferrara; and that the fingers were Giulio Cefare Brancazzo, Francifco Bifballe, Conte de Briatico, Scipione di Palla, and a foprano, whofe name, as his performance was cenfured, the author has concealed; but of the others, he fays, they were moft perfect muficians, and fung in a wonderful manner. It appears by this dialogue, that the vocal performers were not accompanied by a band, but that each fung to his own inftrument. "Pochi mufice fi travano che cantono fopra gli ftormenti che m'abbian finito di contentare, perche tutti errano in qualche cofa, o nella intonatione, o nella pronontiatione, o nel fuonare, o nel fare i paffaggi, a vero nel remettere & rinforzare la voce quando bifogna; le quali cofe, parte per arte & parte per natura s'acquiftano." "There are few muficians," fays the author, "who fing to their inftruments, that have entirely fatisfied me: as they have almoft all fome defect of intonation, utterance, accompaniment, execution of divifions, or manner of diminifhing and fwelling the voice occafionally; in which particulars both art and nature muft confpire to render a performer perfect." The interlocutors then celebrate the talents of two female fingers: Donna Maria di Cardona Marchefe della Padula, and Signora Fagiola, as being poffeffed of all the requifites of vocal perfection.

It may be concluded from this converfation, that the foprano among the male fingers was an evirato; that much art and refinement were expected in vocal performers, befides finging in time and tune; and that, by the titles of count and

and marchionefs given to fome of the perfonages whofe talents are celebrated, whether they are regarded as profeffors or dilettanti, it appears that the fuccefsful cultivation of mufic in the city of Naples was at this time in great eftimation.

DENTICLES, in *Architecture.* See DENTILS.

DENTIDIA, in *Botany*, a Chinefe plant, of which we have no knowledge but from Loureiro's Flora Cochinchinenfis, 369. He defcribes it as belonging to the *Didynamia Gymnofpermia*, and gives the following Eff. Ch. Three upper fegments of the calyx minutely toothed. Upper lip of the corolla fhorteft, four-cleft; lower entire. D. *nankinenfis* is the only fpecies, a native of Nankin, carefully cultivated at Canton for its beauty, and called *Kiām nān tfū fū.* It has the colour and fcent of *Meliffa cretica.* The ftem is herbaceous, annual, upright, a foot high, firm, fquare, ftraight, purple, fmooth, with branches croffing each other. Leaves oppofite, on long ftalks, kidney-fhaped, concave, reflexed, fmooth, fringed, of a brownifh purple hue. Spikes axillary, fquare. Flowers red and white. Loureiro. It is very probable this plant may belong to fome genus already known. The defcription accords in many points with *Perilla ocymoides,* Linn. which is a native of China.

DENTIFORM, in *Mineralogy*, according to Werner, is the form in which metallic or native filver is often found, where it is longifh and tortuous, and thicker at the bottom than the top, where it ends in a point.

DENTIFORMIS PROCESSUS, the fame as *Pyrenoides.*

DENTIFRICE, any fubftance to rub the teeth with, in order to clean or faften them. The term is derived from the Latin *dens, a tooth*, and *frico, I rub.*

Dentifrices are commonly employed in the form of powder, which are either purely mechanical or chemical in their operation. It is ufual for dentifts to keep their tooth-powders as a fecret; but the compofition of moft of them is very well known to medical men, though concealed from the public in general. Very little fkill is required to form a good tooth-powder for ordinary ufe, provided care be taken not to admit ingredients which deftroy the enamel of the teeth. If perfons ufe them daily, the dentifrices fhould be lefs harfh or gritty, and contain lefs acid matter, than when they are ufed only once a week.

The powders generally recommended for this purpofe are, levigated coral, calcareous earths, cuttle-fifh, myrrh, calcined bone, burnt bread or fponge, charcoal, pumice-ftone, foot, &c. to which is added a fmall proportion of alum, cream of tartar, or common falt. But the acid fubftances ufed too freely will deftroy the teeth, and compenfate badly for the whitenefs they produce.

Any of the above powders may be mixed up with honey or butter, and will then form a kind of electuary for rubbing the teeth. Spirituous and aftringent lotions are alfo employed with the fame view, or to harden the gums; and not unfrequently the powder of cafcarilla, or Peruvian bark, is had recourfe to, when the gums are fpongy and apt to bleed.

Many perfons are fo averfe from all dentifrices, that they clean their teeth with a hard brufh alone, or the end of a root prepared on purpofe, rinfing their mouth afterwards with water. Now and then, however, it is requifite to fcrape the tartareous matter from the roots of the teeth, which is called *fcaling* them; elfe, it will be impoffible to preferve their natural whitenefs, and keep them fixed clofely to the gums. The tartar is alfo injurious in decaying the teeth, when it accumulates for a long time. See TEETH.

DENTILS, in *Architecture*, an ornament in cornices of a notched or toothed form; whence its name, from *dentes*, Lat. teeth. (See *Plates* XXVIII. XXIX. of *Architecture.*) The dentils are cut upon a fquare member, which is called by Vitruvius denticulus, and by Englifh authors dentil-band. The proportions are thus given by the former writer; the denticulus is to be equal in height to the middle facia of the architrave, and its projection to be the fame as the height; the width of the dentils is one-half of the height, and the interval between them two-thirds of this quantity.

DENTISCALPRA, in *Surgery*, is the fcraping inftrument employed for removing the extraneous matter which collects upon teeth, and forms a cruft. The tartar, which is left on the teeth, where this operation has been long neglected, will fometimes feparate the gums, produce fome degree of ulceration, and caufe a fœtid breath. See DENTIFRICE and TEETH.

DENTIST, is an artizan who confines himfelf to the extraction of teeth, and to feveral operations required by their defects, redundancies, accidents, or diforders. The word dentift is French, and the moft popular practitioners in this department have come from France; fo, likewife, have the moft ample and regular treatifes on the fubject, fome of which are tedioufly prolix and frivolous. The head furgeons in London deem this branch of their art beneath notice, and generally decline interfering in it, except by giving their advice occafionally: though manual operations on the teeth, and the mechanical formation of thefe organs, in cafes of defect, conftitute a very profitable bufinefs in fuch a large metropolis; fo that dentifts are often known to get feveral thoufand pounds *per annum* by their profeffion!!

DENTITION, in *Anatomy*, the procefs by which the teeth, after they have advanced to a certain ftage of their formation, come through the gum, in order to take their place in the mouth. As there are two different fets of teeth contained in the mouth at different ages, and accommodated, by their fize and number, to the differences which obtain in the jaw-bones of the child and the older fubject, fo we have the firft and the fecond dentition. As the gum appears to be divided by the tooth in this procefs, it is ufually called, in common language, the cutting of the teeth. The age at which each tooth comes through the gum, and the fucceffion in which thefe organs appear in both dentitions, have been already fully detailed in the defcription of the teeth given under the article CRANIUM. We have only to obferve, further, in this place, that the gum makes way for the advancing tooth by a procefs of abforption. That the tooth, in coming towards the alveolar furface of the jaw, is refifted by the gum, which is a firm and tough fubftance, and is thrown into a ftate of confiderable tenfion by the preffure which it experiences. Being of a vafcular and fenfible nature, it is irritated in this way, and confiderable pain enfues, with more or lefs derangement of the whole conftitution. The latter often proceeds fo far as to terminate fatally; and, confequently, the time of the firft dentition is regarded as one of particular danger to the child. That all this mifchief arifes merely from the irritation caufed by the preffure of the tooth, is rendered obvious from this circumftance; that it will ceafe entirely if the gum be divided. The part grows thinner and thinner, where it is preffed by the tooth, and a perforation takes place at laft, through which the projecting edge or point may be difcerned; and then the procefs is finifhed, without any further unpleafant occurrences. The fecond dentition is not attended with the fame circumftances as the firft; fince the permanent teeth come into places left for them by the temporary ones.

DENTITION,

DENTITION, in *Phyfiology* and *Medicine*, the production of the teeth.

The time and mode of the formation and growth of the teeth have been amply treated of under the article CRANIUM. It remains for us to defcribe, in this place,

The Difeafes of Dentition.—The teeth at their firft formation, and for fome time while growing, are completely inclofed within the fockets and gums, and in their growth they act upon the inclofing parts, in fome degree, as extraneous bodies. Hence, while the operation of growth is going on in them, another operation is effected, namely, a decay of that part of the gum and focket that covers the tooth, in confequence of the preffure of the latter, and which becomes the caufe of many difagreeable and even dangerous fymptoms. This preffure induces inflammation and ulceration of the gums, but fuppuration feldom accompanies it. Hunter on the Teeth, part ii. p. 114.

As thefe morbid changes take place at an early age, indeed almoft begin with life, when the irritability of the whole fyftem is extremely great, the fymptoms which enfue are not merely local, but affect the conftitution at large in various ways, and excite a great variety of maladies. Thefe fymptoms are in fact fo various in different children, and often in the fame child, that it is difficult to conceive them to be of the fame origin. They become lefs various, however, and lefs hazardous, as the children advance in age; fo that the double teeth of the child, and ftill more fo the fecond fet of teeth, or thofe of the adult, are ufually cut without producing much difturbance.

The firft fymptoms are local, and appear to be accompanied with pain, as the child is reftlefs, uneafy, and rubs his gums, and carries every thing to his mouth. There are alfo generally inflammation, heat, and fwelling of the gums, and an increafed flow of faliva. A general ftate of fever follows, which is fometimes flight and fometimes violent, and is very remarkable both for its fudden rife and declenfion: fo that in the firft hour of his illnefs the child fhall be perfectly cool, and in the fecond flufhed and burning hot, and in the third temperate again. The local fymptoms which enfue in diftant parts, are various and complicated; for the appearance they put on is in fome degree determined by the nature of the parts which they affect. Thefe fymptoms we fhall defcribe in the order of their moft frequent occurrence.

Diarrhœa, coftivenefs, lofs of appetite, eruptions on the fkin, efpecially on the face and fcalp, cough, fhortnefs of breath, with a kind of convulfed refpiration, fimilar to that obfervable in the hooping-cough, fpafms of particular parts, either by intervals or continued, an increafed fecretion of urine, and fometimes a diminution of that fecretion, a difcharge of matter from the penis, with difficulty and pain in making water, imitating exactly a violent gonorrhœa. The lymphatic glands of the neck are at this time apt to fwell, and if the child has a ftrong tendency to the fcrofula, this irritation will promote that difeafe. There may be other circumftances connected with this diforder, which we do not afcertain, the patients in general not being able to exprefs their feelings.

Many of the fymptoms of this difeafe are dangerous, namely, the conftitutional ones, and alfo thofe local fymptoms which attack a vital part. The fever, indeed, feldom lafts fo long as to be fatal; but the convulfions, efpecially when univerfal, frequently are fo. Local convulfions, if not in a vital part, although often very violent, do not kill; and when any part not vital fympathizes, the patient is generally free from danger; a fecurity to the whole being obtained by the fufferings of a part, which is of little confequence to life.

In the very irritable habits of infants a general fympathy is excited by local irritations; and hence general fever and general convulfions, from the irritated gums in dentition. But as the conftitution ftrengthens, each part, in fome degree acting for itfelf, acquires its own peculiarities; fo that when a local difeafe takes place in a child that is very young, it is capable of calling forth a general fympathy; but as the child advances, the confent of parts in the conftitution becomes lefs general: but fome one part is found which has a greater aptitude than the reft to fall in with the local irritation, and it fympathizes according to its own peculiar action. By the age of fix years, few parts fuffer but thofe immediately affected; and in adults, who cut their teeth, we almoft always find the pain and other fymptoms confined to the part, or only local fympathy taking place, fuch as a fwelling of a fide of the face.

But as the fymptoms become more confined, the fuffering part is often much more violently affected. Therefore we find that, in adults, the pain of cutting a grinder is frequently exceffive, and the local inflammation is very confiderable, and often of long continuance. This is not the cafe with children; their pain does not appear to be fo very confiderable, and we are certain that the local inflammation is not great; that it is confined to the very parts which fuffer, and is not diffufed over the face; fo that, in children, the fymptoms of fympathy are often more violent than thofe of the parts themfelves.

The pains from dentition in the adult are often periodical, having their regular and fixed periods, from which circumftance they are often fuppofed to be agueifh, and the bark is adminiftered, but without effect. Medicines for the rheumatifm are likewife given with as little fuccefs; when a tooth will appear, and difclofe the caufe of the complaint: and by lancing the gums the cure is often performed; but the difeafe will recur, if the gum happens to heal over the tooth, which it will very readily do, if the tooth is pretty deep. As thefe teeth are generally flower in their growth than the others,, and more efpecially thofe which come very late, they become the caufe of many returns of the fymptoms.

The remedies for the difeafes arifing from dentition can in general only be of a temporizing nature, as the diforders cannot be altogether removed, till the caufe ceafes; except indeed, when the tooth is covered by a very thin portion of the gum, in which cafe the fymptoms may be fometimes fpeedily removed by lancing it. Where this cannot be immediately done, and the general fymptoms of fever, or convulfions, appear, palliative meafures muft be adopted. Gentle laxatives, if the bowels are bound, diaphoretics, and fmall dofes of fome anodyne, muft be adminiftered; and the ufe of the warm-bath muft be added, as the moft effectual anodyne, when convulfions occur. If a diarrhœa fhould come on, and in a gentle degree only, it may be allowed to go on; or if fevere, it may be reftrained. But often the fympathetic derangement of the bowels becomes itfelf an irritating caufe, and by fympathy with the brain, contributes to excite fever, and even convulfions. When, therefore, the bowels are much difordered, when there is obvioufly much griping pain, when the ftools are offenfive, and of a morbid appearance, they fhould be cleared by a little calomel and rhubarb, or other laxatives. The ufe of laxative medicines is alfo particularly ferviceable in removing the cutaneous eruptions, which appear during the irritation of teething; fuch as the crufta lactea, ftrophulus, or red-gum, &c.

When the local inflammation is flight, it feems defirable to gratify the inftinctive propenfity, which children manifeft, to rub and prefs the gums; and a piece of wax, or of liquorice root, or fome fubftance of that foft kind, appears to be preferable to the hard, unyielding coral, or glafs, which

is generally employed for that purpoſe. It would be altogether ſuperfluous to mention the numerous abſurd remedies, which ignorance and ſuperſtition have introduced, at different times, to aid the proceſs of dentition; and eſpecially as local applications to the gums. The reader will find them amply detailed in Henlock's Practical Treatiſe on Dentition, 1742. Perhaps a ſhort ſpecimen will ſatisfy him. "There were indeed among the remedies to the gums, ſome few that were in vogue; freſh butter and honey were in pretty general eſteem, perhaps for the toothſomeneſs of them above many others. The brain of a ſucking pig, and the milk of a bitch (whatever averſion this might raiſe in the parent) were commended by ſome for a peculiar property; but more particularly the brain of a hare, which ſeems to carry the univerſal applauſe of the ancients; yet the doubts among them about the beſt mode of uſing it, give reaſon to believe, that it was often recommended upon bare credit. But above all, in neceſſitous caſes, if we may depend upon the teſtimony of Hartman (as mentioned by Burnet) the freſh blood of a cock's comb is truly praiſeworthy; for this, ſays he, being only once, or twice at moſt, anointed on the gums with the finger, cauſes a production of the teeth without difficulty, and free from accidents. This we find alſo recommended by Silvius and Waldſchmidt." Loc. Cit. p. 33. All this, however, is ſcarcely leſs prepoſterous than the wearing of certain necklaces, in our own day, for the purpoſe of alleviating difficult dentition.

"With reſpect to lancing the gums, there was formerly much difference of opinion. But Mr. Hunter ſays, "As far as my experience has taught me, to cut the gum down to the tooth, appears to be the only method of cure. It acts either by taking off the tenſion upon the gum, ariſing from the growth of the tooth, or by preventing the ulceration, which muſt otherwiſe take place. It often happens, particularly when the operation is performed early in the diſeaſe, that the gum will re-unite over the teeth; in which caſe the ſame ſymptoms will be produced, and they muſt be removed by the ſame method. I have performed the operation above ten times upon the ſame teeth; where the diſeaſe had recurred ſo often, and every time with the abſolute removal of the ſymptoms.

"It has been aſſerted, that to cut the gum once will be ſufficient, not only to remove the preſent, but to prevent any future bad ſymptoms from the ſame cauſe. This is contradictory to experiment, and the known laws of the animal œconomy: for frequently the gum, from its thickneſs over the tooth, or other cauſes, muſt neceſſarily heal up again, and the relapſe is as unavoidable as the original diſeaſe. A vulgar prejudice prevails againſt the practice, from an objection, that if the gum is lanced ſo early, as to admit of a re-union, the cicatrized part will be harder than the original gum, and therefore the teeth will find more difficulty in paſſing, and give more pain. But this is alſo contrary to facts; for we find that all parts, which have been the ſeat either of wounds or ſores, are always more ready to give way to preſſure, or any other diſeaſe, which attacks either the part itſelf, or the conſtitution. Therefore each operation tends to make the paſſing of the teeth eaſier." Hunter on the Human Teeth, Part ii. p. 121. See Infants, *Diſeaſes of.*

DENTON, William, in *Biography*, the youngeſt ſon of ſir T. Denton of Hilleſden, in Buckinghamſhire, was born at Stow, in April 1605. He received his education at Magdalen Hall in Oxford, where he was initiated into the practice of medicine, under Dr. Henry Aſhworth. In 1634 he took his degree of doctor, and going ſoon after to reſide in London, he was appointed phyſician to the king, Charles I. During the troubles which ſucceeded, he continued to practiſe in his profeſſion in London, but acted during that time with ſo much moderation, that on the reſtoration of Charles II. he was made one of his phyſicians in ordinary, and was ſoon after admitted fellow of the college of phyſicians. He lived to ſee another revolution, and the acceſſion of king William and queen Mary, to whom, in 1689, he dedicated, "Jus Regiminis," being a juſtification of defenſive arms in general, ſhewing that the revolution was the juſt right of the kingdom. He died at his houſe in Covent Garden, on the 9th of May 1691, and was buried at Hilleſden. His daughter was married to George Nicholas, ſon of ſir Edward Nicholas, ſome time ſecretary of ſtate under the kings Charles I. and II. The titles of his works, which are all on political ſubjects, follow: "Horæ Subſecivæ, or a treatiſe ſhewing the Original, Grounds, Reaſons, and Provocations, neceſſitating our ſanguinary Laws againſt Papiſts, made in the Days of Queen Elizabeth," 1664, 4to. "The Burnt Child dreads the Fire, or an Examination of the Merits of the Papiſts," relating to England, moſtly from their own pens, in juſtification of the late act of parliament, for preventing dangers which may happen, from popiſh recuſants. London, 1675, 4to. "Jus Cæſaris et Eccleſiæ vere dictæ," 1681, fol. To this the author added, on a ſingle ſheet, "An Apology for the Liberty of the Preſs." Wood's Athenæ, Oxon.

Denton, in *Geography*, a town of America, the chief and poſt town of Caroline county, in Maryland, on the E. ſide of Choptank creek, the E. main branch of Choptank river. It is regularly laid out, has a few houſes, and lies 7 miles S. of Greenſborough, and 37 S. S. E. of Cheſter.

DENTZHEIM, a town of Germany, in the circle of the Lower Rhine, and electorate of Treves; 10 miles N. E. of Treves.

DENUDATION, from *de*, and *nudus*, naked. See Exfoliation.

Denudation, in *Geology*. This term has lately been introduced, to expreſs thoſe diſappearances of the upper ſtrata of the earth in particular diſtricts, by which the lower ſtrata are partially expoſed to view. The late ingenious Mr. Whitehurſt, after a careful examination of the mineral limeſtone diſtrict of Derbyſhire, was led to conclude (pages 155, 156, and 165, of his Enquiry concerning the earth, 1ſt edit.) that the ſtrata of grit and ſhale, now found only in broken and detached maſſes, variouſly diſpoſed over the north part of Derbyſhire, once univerſally prevailed, or were ſuperincumbent upon the lime-ſtone diſtrict. This lime-ſtone diſtrict, whoſe limits, through the county of Derby, Mr. Pilkington has ſince pretty accurately deſcribed, in the map prefixed to his "View of Derbyſhire," extends ſome diſtance into Staffordſhire, and is every where at its edge ſurrounded and covered by ſhale, this ſhale by grit-ſtone, and this grit-ſtone by a coal-ſhale, &c. as the recent obſervations of Mr. Smith and his pupils have ſhewn. It alſo appears, that ſmaller patches of the mineral lime-ſtone are expoſed or denudated at Aſhover, and at Crich in Derbyſhire, ſurrounded and covered by ſhale, which is again covered by grit-ſtone and coal-ſhale, as above-mentioned. On the ſouth ſide of the river Thames, a much larger denudation of the ſtrata has happened, in the counties of Surry, Kent, Suſſex, and Hants, as mentioned in our article Coal, bounded by thoſe tracts of high chalk land, known by the names of the North, and the South-Downs, and their connecting chalk range through Hampſhire; the oppoſite extremity being bounded by the Engliſh channel, or more properly, perhaps, by the oppoſite chalk cliffs on the coaſt of France. This laſt denudated diſtrict, called the Wealds of Kent, Suſſex, and Surry, was examined by Mr. Farey in the autumn of 1806, and a ſection acroſs the Surry and Suſſex Wealds, was prepared. (See

(See Dr. Dickfon's Agricultural Magazine, vol. ii. p. 30.) The denudated diftricts of Derbyfhire above-mentioned, were alfo examined by the fame gentleman, and fections croffing two of them, were drawn laft autumn, preparatory to a mineralogical furvey of the whole county, which is now going on. From one of thefe fections, Mr. White Watfon, the well known mineralogift and ftatuary of Bakewell, has fince prepared a tablet for the infpection of the curious, containing all the fubftances compofing the principal ftrata of Derbyfhire, inlaid in their proper pofitions, fo as to exhibit a miniature fection acrofs the county, from Nottinghamfhire to Chefhire, in paffing through the towns of Bolfover, Chefterfield, Bakewell, and Buxton. The inquiries thus making, promife to throw a great light upon, if not entirely to explain, the caufes of the ftupendous denudations above mentioned, and of others perhaps ftill larger, which the ftrata of the Britifh iflands exhibit, and of which we fhall not fail to collect every particular in our power, for the information of our readers on this curious and important fubject.

Some of the characters by which a denudated tract of country are diftinguifhed are the following: 1ft, the fame is furrounded, in great part, or in whole, by upper ftrata in the feries; 2d, the edges of thefe upper ftrata have not that indented or fingered form, which is almoft invariably poffeffed by the endings of ftrata, (fee that article:) 3d, the edges of the upper ftrata fhew evident figns of rupture in their abrupt and broken edges, and are often very ftraight in their direction; 4th, the ftrata, for fome diftance round a denudation, generally rife or incline towards the fame; but in fome rare inftances, as at Crich (fee that article), the ftrata are wholly, or in part, horizontal, or nearly fo, and the edges of the ftrata next above the lower or denudated ftrata may, in that cafe, no where appear on the furface, as the ftrata will all do, in fucceffive rings, round the denudation, when they rife towards it; 5th, the denudated ftratum, or loweft one expofed, frequently forms the higheft ground of the diftrict, and rifes generally on all fides towards a central part, which is much diflocated and broken by ravines and fiffures; 6th, the fucceffive rings of ftrata round a denudation, often form diftinct rifes like fteps, the top or plane of each of which generally correfponds with fome parting or loofer ftratum, where the ftrata had lefs adherence to each other than in the folid mafs of each ftratum; 7th, denudated diftricts have feldom any rolled pebbles or alluvial matters on them, however thickly they may be diftributed on the ftrata which furround or form the edges of the denudation: of this the great Suffex denudation furnifhes a remarkable inftance; 8th, within denudated diftricts, it is not uncommon to find patches often of confiderable extent, having more of the fuperincumbent ftrata upon them, than on the parts which furround them, and yet the top of the upper of thefe accumulated ftrata are feldom higher than the furrounding ground; and, on the other hand, ifolated patches of lower ftrata are frequently feen on the furface, furrounded by higher ftrata in the feries, and yet thefe inferior denudations feldom have their furface lower, but often much higher than the furrounding ground; of this, Crich-hill above-mentioned may be cited as an inftance; for the great Derbyfhire and Staffordfhire denudation, in the difappearance of the upper ftrata, extends much beyond both this place and Afhover, which alfo is an inferior denudation, within the verge of the great one; and, 9th, all the denudations which have been examined in England, feem to be largeft in extent in a direction nearly approaching to N.W. and S.E. The above obfervations, which have been often repeated with others, perhaps, which are noted in the travelling common-place book of the writer, but were never yet collected out, tend, as he thinks, clearly to fhew, that denudated diftricts were, moft of them, at fome period, heaved up to a much greater height than at prefent, and that the higher or moft projecting of thefe lifted parts of the earth were fcalped or torn away, and no veftige of them left! That thefe denudations, or fcalpings of the country, did not take place from volcanic explofions, or the action of any power from beneath, cafting away the fuperincumbent ftrata, will, he thinks, appear evident, becaufe all fuch caufes muft have had the greateft effect in tearing up the loweft ftrata, which moft confined its action, and fcattering them in the form of a crater; while the borders of fuch a diflocated diftrict muft have remained ftrewed with the difplaced fragments of ftrata, as the flanks of volcanic mountains are known to be.

It is prefumed, that the new theory on this fubject, which Mr. Farey firft fhortly promulgated in the Philofophical Magazine, vol. xxv. p. 45, and vol. xxviii. p. 120, and of which we have fince given fome further illuftrations in our articles Colliery, Continent, and others, will fatisfactorily account for the phenomena of denudation, in fhewing, that a power once acting from above, on known mechanical principles, was adequate to effects ftill greater than any which he has examined on the furface of the globe, or has contemplated from the writings and defcriptions of others, ftupendous as thefe appear to be, and which the all-wife Creator has, as in all his other works, brought about by means the moft fimple, and who, out of a period of apparent violence and diforder, which muft baffle all attempts at defcription, at length brought about a ftate of the terraqueous globe, fo perfectly fitted for the habitation and ufes of the numerous beings, fince created for its habitation, that the moft fertile imagination cannot, it is prefumed, fuggeft one alteration in the cruft of the earth, which would really improve the condition of the animate beings who inhabit it. The minute examination of the interefting diftrict in and near Derbyfhire, which the gentleman alluded to has undertaken to make, under the liberal patronage of the worthy prefident of the Royal Society of London, will, we truft, foon enable us, by their publication, to enter more fully into his theory, and the application of the fame to the facts of the Britifh ftrata, as the articles referring to them occur in our work.

DENUNCIATION, Denunciatio, a folemn publication, or promulgation of any thing.

All veffels of enemies are lawful prize after denunciation, or proclamation of war.

The defign of the denunciation of excommunicated perfons is, that the fentence may be the more fully executed; that the perfons may be known, the entrance into the church refufed them, and that other people may be warned not to have any communication with them.

DENUTAR, in *Geography*, a town of Egypt on the Nile; 8 miles N.E. of Shabur.

DENYS, John, in *Biography*, doctor in medicine, of Montpelier, where he received his education, is only remembered for the zeal with which he recommended the transfufion of blood for the cure of difeafes. Dr. Lower had publifhed in the Philofophical Tranfactions for the year 1666, an account of the effects of transfufing the blood of one animal into the veins of another, but Denys was probably the firft who tried the experiment on the human body, of which he gave an account in the Journal Des Savans for the year 1667. The following year he publifhed "Lettre Ecrite a M. de Montmor touchant une nouvelle maniere de guerir plufieurs maladies par la transfufion du fang," 4to. Paris. In this he tells

as he had reftored to his reafon a lunatic, and had cured a M. de Bonde, a Swifs, but his patients unfortunately dying, the parliament prohibited any further experiments being made on human fubjects

Denys, James, a native of Leyden, rendered himfelf famed as the difciple, coadjutor, and, at length, the fucceffor of M Rau, the lithotomift, and not lefs fo for his fkill in the art of midwifery, on which fubject he has left one of the beft works extant. He was the phyfician and man midwife to the college for improving the practice of midwifery, which was inftituted at Leyden in the year 1719. In 1731, he publifhed "Obfervationes chirurgicæ de calculo renum, veficæ, urethræ, lithotomia, veficæ punctura, &c." 8vo. The volume contains many valuable obfervations on the figns, by which it may be difcovered whether there is a ftone in the bladder, and a defcription of a great variety of ftones, differing in their appearance and texture, of which he appears to have made a large collection. The difeafe is very common in Holland; in Batavia it is very rare. He cut out a ftone from the knee of one of his patients, and took from the bladder of a fubject he diffected, a large ftone, having feveral branches, which had given the perfon no difturbance in his life-time. His treatife on midwifery, publifhed in 1733, is written in the Dutch language. It has not been tranflated, Haller fays, and is, therefore, lefs known than for its merit it deferves. Haller Bib. Chir.

Denys, Jacques, a painter of hiftory and portrait, was born at Antwerp in 1645, and going in his youth to Rome and Venice, fpent fome years in copying the works of Raphael, Julio Romano, Guido, and Titian; thus forming his tafte of defign and colouring from the compofitions of thofe celebrated mafters. Having been invited by the archduchefs of Mantua to her court, he was taken into her fervice; and not long after he obtained permiffion to vifit Florence, where he painted the portraits of the duke of Tufcany and his family: in confequence of which, he received valuable prefents, and was honoured by the duke with letters patent, expreffing his efteem of the artift's talents and perfonal merit. On his return to Mantua, he finifhed feveral grand hiftorical compofitions for his patronefs, and adorned the principal apartments of the palace with his excellent performances. Attached to his country, from which he had been abfent in Italy for 14 years, he returned to Antwerp, loaded with riches and honours. His reception was highly honourable; but he foon after died, much regretted in every part of Europe, whither his fame had extended. Moft of his works are in Italy; neverthelefs, at Antwerp there is to be feen an "Ecce Homo" of his painting, which, with regard to defign and colouring, is altogether in the ftyle of Vandyck; and in the fame city there is a portrait, beautifully coloured, and painted with fingular freedom and force. He was remarkable for correctnefs of defign, and boldnefs of colouring; and his manner is faid to have more of the fchool of Italy than that of Flanders. Pilkington.

Denys, *St.* in Latin *Fanum Sancti Dionyfii*, or *Sanctus Dionyfius in Francia*, as it was emphatically called, *Saint Denys en France*, in *Geography*, is an ancient town of France, chief place of a diftrict of the fame name, in the department of the Seine, with a population of 4425 individuals. Its canton contains 11,510 inhabitants, diftributed in eleven communes, upon a territorial extent of $51\frac{6}{10}$ kiliometres. The diftrict counts four cantons, 36 communes, a territorial extent of 208 kiliometres, and 42,984 inhabitants. The foil of the diftrict is uncommonly fertile, and produces all forts of corn. The town, which has a fub-prefect, and fome calico manufactures, is fituated on a fine plain on the river Crould, not far from the Seine, fix miles N. of Paris. Lat. 48° 56′ 8″. But St. Denys is chiefly famous for a celebrated abbey of Benedictines, which was founded here by king Clothar, in the year 600 of our era, and greatly improved by his fon Dagobert, and by feveral fucceeding French kings. The church is built of the fineft free-ftone, in the true Gothic ftyle, and much admired. It contained a very rich treafury, and the crown jewels, and was the place of interment for the kings of France, and their families. The firft king buried here was Dagobert. Among the moft remarkable monuments in this church, were thofe of Louis XII and his queen, Henry II. with his confort and children, Bertrand du Guefcelin, conftable of France, and marfhal Turenne. During the exceffes of the French revolution, and in particular towards the end of the year 1792, the church of St. Denys was robbed of its treafure; its tombs were opened, the afhes of the kings fcattered in the wind, the bones of thofe more recently buried were thrown into a hole dug for the purpofe, the infcriptions defaced, the monuments overturned, mutilated, carried away, or robbed of every gold and gilt ornament. The building of the temple itfelf was confiderably damaged; but fome of the monuments were faved from the deftructive fury of the mob, in a tolerable condition, and preferved in the mufæum of French monuments at Paris, eftablifhed by Mr. Le Noir, in the former church of the Petits Auguftins, Fauxbourg St. Germain, which is now a national eftablifhment. It was at the fame revolutionary epoch, that the name of St. Denys was changed into that of La Franciade, which the town bore, until Bonaparte placed himfelf at the head of the French government: and fince this extraordinary man has affumed the imperial purple, the church has been repaired, and ornamented with two windows, which are much admired for their uncommonly fine painted glafs. In the nave, on the right hand, two beautiful expiatory altars have been placed, one for the Merovingian, the other for the Carlovingian race. Between thefe altars is a column deftined to be adorned with the portraits of the fix French monarchs, who were at the fame time emperors. On the left fide of the nave is an expiatory altar for the third dynafty of the Capets. In the centre is the principal altar, with marble ftair-cafes leading to the choirs. The vault, which contained the tombs of the kings, is completely reftored, and provided with a magnificent gate of gilt brafs. It is deftined for the princes of the fourth, or Napoleon dynafty. The eldeft fon of Louis Bonaparte, (king of Holland) an infant, has lately been interred in this vault with imperial folemnity. There are feveral other fmall towns of the name of St. Denys, in France, as St. Denys in the department of Oude, nine miles fouth of St. Papoul; St. Denys d'Anjou, in the department of Mayenne, five miles S. W. of Sable; St. Denys de Candé, which is now fimply called Candé, the chief place of a canton, in the diftrict of Segré, department of Maine and Loire, with 948 inhabitants, fix communes, and a population of 6343 individuals for the whole canton, which has an extent of 285 kiliometres; St. Denys de Jargeau, in the department of the Loiret, with a bridge over the Loire, 12 miles S. E. of Orleans; St. Denys de Gaft, in the department de la Manche, 12 miles S. by E. of Coutances.

Denys, a fmall river of America, in the ftate of Maine, and county of Wafhington, 22 miles E. of Machias. Its fource is in a pond about fix or eight miles long, and about two miles wide, called Medabemps, in which are the extremities of four townfhips or plantations. After running a fouth-eafterly courfe about 15 or 20 miles, it

it joins the N. branch of Kobbefkook, and paffing by Eaftport on the N. difcharges itfelf into the Weft paffage, between Campo Bello and the Main. In 1794, the country between this river and Machias was a wildernefs; the banks of this river were at this time thinly fettled by a regular and well-difpofed people.

DENYSVILLE, a poft town of Wafhington county, in the ftate of Maine; 27 miles E. of Machias.

DEOBRIGA, in *Ancient Geography*, a municipal town of Spain, in the country of the Autrigons; according to Ptolemy and the Itinerary of Antonine.—Alfo, a town of Spain in Lufitania.

DEOBRIGALA, a town of Spain, in the Tarragonefe territory.

DEOBSTRUENT MEDICINES, are thofe to which are attributed powers of removing obftructions, which have taken place in any of the veffels of the body. This general term, according to the older writers on the Materia Medica, includes a variety of medicines of different qualities; thus Alfton obferves, in different obftructions, relaxants, refolvents, attenuants, evacuants, and ftimulants, are indicated, according to the nature of the obftructing liquids, whether phlegmatic or inflammatory, acrid, or not acrid, &c. See his Mater. Medica, vol. i. p. 51. But Dr. Cullen has properly banifhed this as a general term; both becaufe it includes medicines of various powers; and becaufe the theory, upon which the term is founded, is falfe, or at leaft altogether gratuitous. For there are no juft grounds for the fuppofition, that certain diforders confift of obftructions to the circulation, depending upon a matter filling up the veffels; that the matter is of a certain acrimony, to be corrected by certain medicines; or that any medicines are known capable of penetrating, as fuch, to the veffels of any particular vifcus. The only mode in which obftructions, as they have been called, can be removed, is, by the ufe of local ftimulants to the veffels of the part, where that is practicable, or of general ftrengtheners to the fyftem where it is not, or of both combined.

DEODAND, in *Law*, denotes any perfonal chattel, which is the immediate occafion of the death of any reafonable creature, and which is forfeited to the king, to be applied to pious ufes, and diftributed in alms by his high almoner; (1 Hal. P. C. 419. Fleta, l. 1. c. 25. Staunf. P. C. 20, 21.) though formerly deftined to a more fuperftitious purpofe. In the blind days of popery, it feems to have been originally defigned as an expiation for the fouls of fuch as were fnatched away by fudden death; and for that purpofe ought properly to have been given to holy church; in the fame manner as the apparel of a ftranger, who was found dead, was applied to purchafe maffes for the good of his foul: this may account for that rule of law, that no deodand is due, where an infant under the age of difcretion is killed by a fall *from* a cart, or horfe, or the like, not being in motion, (3 Inft. 57. 1 Hal. P. C. 422.); whereas if an adult perfon fall from thence and is killed, the thing is certainly forfeited. The true ground of this rule feems to be, not as fir Matthew Hale ftates it, becaufe an infant is not able to take care of himfelf, but becaufe the child, by its want of difcretion, was prefumed incapable of actual fin, and therefore needed no deodand to purchafe propitiatory maffes; whereas every adult, who died in actual fin, ftood in need of fuch atonement, according to the humane fuperftition of the founders of the Englifh law. Such is the law, if a perfon be killed by a fall from a thing ftanding ftill. But if a horfe, or ox, or other animal, of his own motion, kill as well an infant as an adult, or if a cart run over him, they fhall in either cafe be forfeited as deodands; which is grounded upon this additional reafon, that fuch misfortunes are in part owing to the negligence of the owner, and therefore he is properly punifhed by fuch forfeiture. "Omnia quæ movent ad mortem," fays Bracton (l. 3. c. 5.) "funt deo danda," *i. e.* what moves to death is deodand. A fimilar punifhment was in like cafes inflicted by the Mofaical law (Exod. xxi. 28.); "if an ox gore a man or a woman, that they die, then the ox fhall be furely ftoned, and his flefh fhall not be eaten; but the owner of the ox fhall be quit." And among the Athenians (Æfchin. cont. Ctefiphon.) whatever was the caufe of a man's death, by falling upon him, was exterminated or caft out of the dominions of the republic. By our ancient law, a well in which a perfon was drowned, was ordered to be filled up, under the infpection of the coroner. (Flet. l. 1. c. 25. § 10.) Where a thing not in motion is the occafion of a man's death, that part only which is the immediate caufe is forfeited; as if a man be climbing up the wheel of a cart, and is killed by falling from it, the wheel alone is a deodand (1 Hal. P. C. 422.); but wherever the thing is in motion, not only that part which immediately gives the wound, (as the wheel, which runs over his body,) but all things which move with it and help to make the wound more dangerous, (as the cart and loading, which increafe the preffure of the wheel) are forfeited. (1 Hawk. P. C. c. 26.) It is of no importance whether the owner were concerned in the killing or not; for if a man kills another with my fword, the fword is forfeited as an accurfed thing. And, therefore, in all indictments for homicide, the inftrument of death and the value are prefented and found by the grand jury, (as that the ftroke was given by a certain penknife, value fix pence) that the king, or his grantee, may claim the deodand: for it is no deodand, unlefs it be prefented as fuch by a jury of twelve men. (3 Inft. 57.) No deodands are due for accidents happening upon the high feas, that being out of the jurifdiction of the common law; but if a man fall from a boat or fhip in frefh water, and is drowned, it hath been faid, that the veffel and cargo are in ftrictnefs of law a deodand. (3 Inft. 58. 1 Hal. P. C. 423. Molloy de jur. marit. 2. 225.) But juries have of late very frequently taken upon themfelves to mitigate thefe forfeitures, by finding only fome trifling thing, or part of an entire thing, to have been the occafion of the death. And in fuch cafes, although the finding by the jury be hardly warrantable by law, the court of king's bench hath generally refufed to interfere on behalf of the lord of the franchife, to affift fo unequitable a claim. (Fofter of homicide, 266.) If a perfon wounded by any accident, as of a cart, horfe, &c. die within a year and a day after, what occafioned it is deodand; fo that if a horfe ftrikes a man, and the owner afterwards fell the horfe, and the party that was ftricken die of the ftroke, the horfe, notwithftanding the fale, fhall be forfeited as deodand, (Plowd. 260. 5 Rep. 110.) The goods and chattels of felo de fe, &c. were univerfally held to be deodands, and are now forfeitable to the crown. See FELO DE SE.

Deodands, and forfeitures in general, as well as wrecks, treafure-trove, royal fifh, mines, waifs, and eftrays, may be granted by the king to particular fubjects, as a royal franchife; and, indeed, they are for the moft part granted out to the lords of manors, or other liberties; to the perverfion of their original defign. Blackft. Com. Book i.

DEOGIRE, or DEOGUR, in *Geography*, a town of Hindooftan, in the country of Berar; anciently a capital city, and the refidence of the rajah of Goondwareh, or, as he is called in the Ayin Acbaree, the Goondrajah: 55 miles N. N. W. of Nagpour, and 75 N. E. of Ellichpour. N. lat. 21°

21° 54'. E. long. 79° 12'. This city muft not be confounded with another of the fame name, which ftood near the fite of Dowlatabad.

When the Deccan was firft invaded by the Patan emperors of Delhi, Deogire was the capital of the province of Dowlatabad, and was fituated near the fortrefs of the fame name; which is built upon a mountain, about four or five coffes to the N. W. of Aurengabad; and is deemed impregnable by the people of the country. The emperor Mahomet, in the 14th century, made an attempt to eftablifh the capital of his empire at Deogire; and to that end almoft ruined Delhi, in order to drive the inhabitants to his new capital, about 750 miles from their ancient habitations. The fcheme, however, did not fucceed. Deogire, which ftood in the neighbourhood of Dowlatabad, was the greateft and richeft principality in the Deccan; and the fame of its riches incited Alla to attack it in 1293; and the pagodas of Elora, in the vicinity, which are elaborate monuments of fuperftition, were probably the offspring of that abundant wealth, under a government purely Hindoo.

DEOGUR, or Deogire, a town of Hindooftan, in the country of Agra; 20 miles S. of Gohud or Gohd.—Alfo, a town of Hindooftan, in the country of Bahar; 72 miles S. E. of Bahar.

DEOLARY, a town of Afia, in the country of Almora; 10 miles W. of Rampour.

DEOLS, Vicus Dolensis, a town of France, in the province of Lower Berri (now the department of the Indre) containing 900 inhabitants, but formerly more populous: feated on the Indre; called Bourg-Dieu; which fee.

DE ONERANDO *pro rata portionis*, in the *Law* of England, a writ that lies where one is diftrained for a rent that is to be paid proportionally by others; thus, if a man holds ten acres of land by fealty, and ten fhillings rent, of the king: and aliens, one acre to one, and another to another, in fee; and afterwards the fheriff diftrains only one of them for the rent; he that is fo diftrained may have his writ for this relief.

DEONNELLY, in *Geography*, a town of Hindooftan, in the Myfore country; 19 miles N. N. E. of Bangalore.

DEOPPA. See Douper.

DEOPPILANTIA, in the *Materia Medica*, a term fynonymous with *Deobftruentia*, and fuppofed to act by removing obftructions, depending on a matter filling up the veffels. See Deobstruent.

DEORUM, Currus, in *Ancient Geography*, a mountain of Africa in interior Libya: thought to be the mountain of *Sierra Leona*.

Deorum, *Infulæ*, two iflands placed by Ptolemy in the ocean, on the coaft of Spain: fuppofed to be the *ifles of Bayonne*.

DEOSCULATION, Deosculatio, in *Antiquity*, one of the moft ancient forms of adoration.

DEOUGEN, in *Geography*, a town of Perfia, in the province of Segeftan; 33 miles S. W. of Kin.

DEPARCIEUX, Anthony, in *Biography*, a mathematician of eminence, was born in 1703 of obfcure parents at Clolez de Ceffoux in France. He was inducted into the mathematics by a learned jefuit of Lyons; he then went to Paris, where he acquired confiderable patronage. Here he partly fupported himfelf by giving lectures in the branches of fcience in which he excelled, and partly by the conftruction of dials, and the drawing of meridian lines, for which he was highly celebrated. He was likewife a confiderable mechanician, and was frequently confulted by perfons who had works of importance to erect. He is ftill remembered by the water-works of Crecy: by a pump of fingular conftruction, and by a very ufeful and powerful prefs. But what renders him more generally refpected at Paris is "A Memoir on the Inundations of the Seine," and "Memoirs on the poffibility of bringing to Paris the waters of the river Yvette." As an author, Deparcieux publifhed on plane and fpherical trigonometry: and took confiderable pains in bringing to perfection a branch of political arithmetic by "Effays on the Probabilities of the Duration of Human Life." This work procured him admiffion into the Academy of Sciences. He was likewife member of the academies at Stockholm and Berlin. He died in September 1768, leaving behind him a high character for great fimplicity and general benevolence. Gen. Biog.

DEPART, *the Procefs of*, in *Chemiftry*, or *Parting*, as it is more commonly termed, is the operation of feparating gold from filver when thefe two metals are mixed, and is performed by aquafortis, which, with proper management, may be made to diffolve the filver and leave the gold. See the articles Gold, Silver, and Refining.

Depart, in *Geography*, a fmall town of France, in the department of the Upper Pyréenes, on the river Gave, oppofite Orthez.

DEPARTMENT, in *Architecture*, that part of an edifice, deftined for fome peculiar purpofe: as in a palace, the department of the kitchen, of the ftables, &c.

Department, in *Geography*, one of the diftricts or diftinct provinces into which France was divided by the National Affembly, A. D. 1790, afterwards in 1795, and finally eftablifhed in the 8th year of the Republic. Thofe of Corfica, the Elbe, and Piedmont, were afterwards added; and the whole number of departments amounts to 109. Each department is again fubdivided into a certain number of diftricts, called "communal arrondiffements," and thefe are further fubdivided into "cantons." Moreover, each canton is compofed of a certain number of "communes." A commune is fometimes a fingle town, and fometime a collection of feveral villages, poffeffing a mayor, and a communal municipality. All the confiderable cities are divided into feveral communes. The government of each department is adminiftered by a præfect, and as many fubpræfects as it contains diftricts. The details of the adminiftration defcend from the fubpræfects to the mayors, who are appointed by the emperor. Each diftrict has a primary judicial tribunal, and each department a criminal tribunal. To every three departments belongs a tribunal of appeal, which takes cognizance, by appeal, of all the caufes determined by the tribunals of the diftricts under its jurifdiction: and each canton has a juftice of the peace. All the tribunals of appeal acknowledge a fuperior tribunal, called "the court of caffation," poffeffing the power of annulling the fentences of the tribunals of appeal which appear to it illegal, and of referring the examination of the caufe to any other tribunal which it fhall pleafe to appoint. All the judges are dependents upon the government, the two great fprings of which are the præfects and the gendarmerie. The præfects are appointed by the emperor, and are renewable at his pleafure. They poffefs his confidence, and exercife his authority in the provinces. The gendarmerie is compofed of about 20,000 men, horfe and foot, in 27 divifions. Each gendarme is a kind of fpy, and an ambulating, armed juftice of peace, who has the power of arrefting whomfoever he pleafes, and of paying domiciliary vifits at all hours of the day or night.

If we fuppofe France, with its acquired territories, to be divided into 10 regions, the departments belonging to each region are as follows: 1. The region called the reunited country, contains 13 departments, *viz.* Roer, Rhine and Mofelle, Mont-Tonnerre, Saare, Forets, Sambre and Meufe, Jemmappes,

mappes, Lys, Escaut or Scheldt, Deux-Nethes, Meuse Inferieure, Ourthe, and Dyle. 2. The northern region contains 11 departments, *viz.* Pas de Calais, Du Nord, Aisne, Seine and Marne, Seine, Seine and Oise, Eure and Loire, Eure, Seine Inferieur, Somme, and Oise. 3. The north-east region includes 10 departments, *viz.* Ardennes, Meuse, Moselle, Bas-Rhin, Haut-Rhin, Vosges, Haute-Marne, Aube, Marne, and Meurthe. 4. The eastern region comprehends 11 departments, *viz.* Cote d'Or, Haute Saone, Doubs, Leman, Mont-Blanc, Isere, Loire, Saone and Loire, Jura, Ain, and Rhone. 5. The south-east region contains 12 departments, *viz.* Haute-Loire, Ardeche, Drome, Hautes-Alpes, Basses-Alpes, Alpes-Maritimes, Var, Bouches du Rhine, Gard, Vaucluse; and the two departments of the island of Corsica, *i. e.* Golo and Liamone; the Elbe and its dependencies, Capraia, Pianosa, Palmajola, and Monte Christo, united to the French territories in 1802, form a distinct department. 6. The southern region comprehends 9 departments, *viz.* Correze, Cantal, Lozere, Herault, Pyrenées Orientales, Aude, Tarn, Lot, and Aveiron. 7. The south-west, or Garonne, region includes 9 departments, *viz.* Gironde, Dordogne, Lot and Garonne, Haute-Garonne, Ariege, Hautes-Pyrenées, Basses-Pyrenées, Les Landes, and Gers. 8. The western region contains 9 departments, *viz.* Loire Inferieure, Mayenne and Loire, Indre and Loire, Vienne, Haute-Vienne, Charente, Charente-Inferieure, Vendée, and Deux Sévres. 9. The north-west region comprehends 9 departments, *viz.* Manche, Calvados, Orne, Sarthe, Mayenne, Morbihan, Finisterre, Cotes du Nord, and Ille and Vilaine. 10. The central region includes 9 departments, *viz.* Loir and Cher, Loiret, Yonne, Nievre, Allier, Puy de Dome, Creuse, Indre, and Cher. Piedmont, united to the French republic in 1802, includes the 6 following departments, *viz.* Doire, Sesia, Marengo, Tanaro, Stura, and Po. See a more particular account of each department under its appropriate article.

An alphabetical List of Departments, specifying their Relations to the Provinces into which France was formerly divided, together with their Extent, Subdivisions, and Population, according to M. Hassenfratz, &c.

Departments.	Chief Towns.	Provinces, &c. to which they belonged.	Extent in French Leagues.		Circles.	Cantons.	Population.
			Length.	Breadth.			
Ain - - - -	Bourg - -	Dombes, Bresse, Buguey - -	22	17	9	49	307,756
Aisne - ..	Laon - -	Flanders, Hainault, &c. - -	36	17	4	63	407,905
Allier - -	Moulins - -	Bourbonnais - - - -	34	20	6	59	267,126
Alps, Lower - -	Digne - - -	Upper Provence - - -	35	20	5	43	168 937
—— Upper - -	Gap - -	Gapencais, Embrunais, &c. -	34	30	4	39	120,485
—— Maritime -	Nice - -	County of Nice - - -			3	20	96,585
Ardeche - -	Privas - -	Vivarais, Cevennes - -	26	17	6	66	247,612
Ardennes - -	Sedan - -	Sedan, Rethelais, and Porcien -	278 sq. leag.		5	34	263.936
Arriege - -	Mezieres - -	Rethelais, Porcien, Sedan -	25	17	3	28	197,889
Aube - -	Troyes - -	Champagne Proper - -	28	22	6	53	288,885
Aude - -	Carcassone - -	Lower Languedoc - -	30	22	6	45	239,642
Aveiron - -	Rodes - -	Rouergue, Marche - -	35	31	9	81	371,835
Bouches du Rhone	Aix - -	Lower Provence - - -	30	20	5	40	446,645
Calvados - -	Caen - -	Caen, Bessin, Bocage, &c.	32	32	6	71	391,332
Cantal - -	Aurillac - -	Upper Auvergne - - -	24	22	4	20	239,972
Charente - -	Angouleme -	Angoumois - - -	30	25	6	44	339,789
Charente, Lower -	Saintes -	Saintonge, Aunis - - -	40	22	7	47	438,042
Cher - -	Bourges - -	Upper Berri - - -	35	24	7	42	207,341
Correze - -	Tulle - -	Lower Limozin - -	22	20	4	40	269,767
Corsica - -	Bastia - -	Corsica, 2 departments - -	34	17			247,779
Cote d'Or - -	Dijon - -	Montagne, Auxois, Dijonnais -	32	25	7	88	342,980
Cotes du Nord -	St. Brieux - -	Upper Bretagne - - -	30	15	9	81	523,860
Creuse - -	Gueret - -	Marche - - - -	20	19	7	35	238,352
Dordogne - -	Perigueux - -	Besançon in Franche-Compté -	30	30	10	72	433,743
Doubs - -	Besançon - -	Besançon - - -	26	15	6	51	219 642
Drome - -	Valence - -	Valentinois, Diois - -			6	62	246,687
Dyle - -	Bruxelles - -	Part of Dutch Brabant -	181 sq. leag.		3	30	363,956
Escaut - -	Gand - -	Part of Austrian Flanders -	159 sq. leag.		4	41	595,258
Eure - -	Evreux - -	Pays d'Ouche, in Normandy -	30	27	6	55	407,352
Eure and Loire -	Chartres - -	Beauce - - - -	28	26	6	40	256,656
Finisterre - -	Quimper - -	Lower Bretagne - - -			9	80	285,730
Forets - -	Luxembourg -	Luxembourg and Buillon - -			4	27	199,011
Gand - -	Nimes - -	Lower Languedoc - -	30	25	8	57	313,464
Garonne, Upper -	Toulouse - -	Upper Languedoc - -	43	26	8	55	456,337
Gers - -	Auch - -	Armagnac, Condomois, &c.	17	12	6	45	315,854
Gironde - -	Bourdeaux - -	Bordelois, Blayois, &c. - -	34	30	7	72	497,391
Herault - -	Montpellier - -	Lower Languedoc - -	35	20	4	52	290,126
Jemmappe - -	Mons - -	Austrian Hainault - -			5	28	408,688
Ille and Villaine -	Rennes - -	Upper Bretagne - -	27	22	9	79	519,169

Departments.	Chief Towns.	Provinces, &c. to which they belonged.	Extent in French Leagues. Length.	Breadth.	Circles.	Cantons.	Population.
Indre	Chateauroux	Lower Berri	24	20	6	48	229,768
Indre and Loire	Tours	Touraine	27	24	7	35	272,925
Isere	Grenoble	Gresivaud, &c. in Dauphiné	36	24	4	91	365,380
Jura	Lons-le-Saunier	Dole and Aval, in Franche Comté	24	16	6	62	282,200
Lake Leman	Geneva	Gex, Savoy, Geneva			3	19	96,000
Landes	Mont de Marsan	Landes, Chalosse, &c.	26	25	4	25	257,387
Loir and Cher	Blois	Blasois, Sologne	34	23	6	30	200 227
Loire, Upper	Le Pui	Velay, Cevennes	26	17	3	32	216,150
——— Lower	Nantes	Upper Bretagne	30	27	9	53	331,270
Loire	Montbrison	Forrez, in Lyonnais	24	12	3	43	322,966
Loiret	Orleans	Orleanais	30	24	6	59	285,766
Lot	Cahors	Quercy, in Guienne	34	30	7	48	443,667
Lot and Garonne	Toulouse	Upper Languedoc	23	18	9	72	411,808
Lozere	Mende	Gevaudan, Cevennes	18	15	7	52	142,110
Lys	Bruges	Austrian Flanders			3	28	475,118
Manche	St. Lo	Cotentin, Avranchin	35	14	7	63	463,320
Marne	Reims	Remois, Pertois	33	30	6	73	348,885
——— Upper	Chaumont	Bassigny, in Champagne	29	19	6	71	223,010
Mayenne	Laval	Upper Maine	22	16	7	68	323,607
Mayenne and Loire	Angers	Anjou	26	21	8	99	445,500
Meurthe	Nancy	Lorraine, Toulois	26	16	9	74	351,161
Meuse	Bar-sur-Ornain	Barrois, Verdunois	33	16	8	79	268,108
——— Lower	Mæstricht	Liege, Gueldre			3	30	216,566
Mont Blanc	Chambery	Savoy	30	34	6	75	423,635
Mont Terrible					2	13	49,311
Mont Tonnerre	Mayence	Electorate of Mentz, &c.	20	19	4	37	280,000
Morbihan	Vannes	Lower Bretagne	27	20	9	70	281,565
Moselle	Metz	Messin, Luxembourg, &c.	45	17	9	76	328,365
Deux Nethes	Antwerp	Part of Brabant	19	13	1	23	153,981
Nievre	Nevers	Nivernais	24	23	9	47	235,699
Nord	Douay	French Flanders, Hainault, &c.	44	10	8	59	447,910
Oise	Beauvais	Beauvoisis	27	18	9	76	385,206
Orne	Alençon	Marches, Alençon, &c.	32	15	6	51	348,972
Ourthe	Liege	Liege, Limbourg	12	12	5	36	310,444
Pas de Calais	Arras	Artois, Calaisis, &c.	37	15	8	85	532,739
Puy de Dôme	Clermont	Lower Auvergne	35	22	8	71	516,593
Pyrenées, Lower	Pau	Bearn, Basquis	16	10	6	44	138,339
——— Upper	Tarbes	Bigorre, in Gascogne	20	16	5	30	188,690
——— Eastern	Perpignan	Roussillon	28	15	3	25	114,158
Rhine, Lower	Strasbourg	Lower Alsace	30	15	5	30	415,080
———, Upper	Colmar	Upper Alsace, Sundtgaw, &c.	24	14	3	25	283,252
Rhine and Moselle	Coblentz	Electorate of Treves	25	12	3	30	372,000
Rhone	Lyon	Lyonnais, Beaujolais	20	9	2	32	323,177
Roer	Aix-le-Chapelle	Juliers and Cologne	23	13	4	40	324,960
Sambre and Meuse	Namur	Namur and Liege	20	15	4	26	150,754
Soane, Upper			26	17	6	48	264,111
Soane and Loire	Maçon	Autonais, Maconnais, &c.	34	24	7	50	442,600
Sarre	Treves	Treves, Deuxponts, &c.	39	14	3	31	440,000
Sarthe	Le Mans	Lower Maine	25	20	9	33	347,837
Seine		Part of Isle de France	6	5	8	17	947,472
——— Lower	Rouen	Roumois, Pays de Caux, &c.	35	29	7	64	536,400
Seine and Marne	Melun	Gatinais and Brie	32	16	5	37	296,467
Seine and Oise	Versailles	Mantais, Vex in Francais	24	18	9	59	471,612
Sevres Deux	Niort	Lower Poitou	32	12	6	50	259,122
Somme	Amiens	Ponthieu, Santerre, &c.	34	16	5	72	381,760
Tarn	Alby	Upper Languedoc	30	20	5	48	289,148
Var	Draguignan	Lower Provence	30	20	9	80	275,472
Vaucluse	Avignon	Venaissin and Orange	15	10	4	52	200 500
Vendee	Fontenay	Saintonge, Aunis	24	21	6	58	305,610
Vienne	Poi	Upper Poitou	24	13	6	49	257 953
Vienne, Upper	Limoges	Upper Limosin	26	12	5	40	266,910
Vosges	Epinal	Pays des Vosges	26	16	9	60	289,054
Yonne	Auxerre	Auxerrois	29	25	7	69	364,969

Department, in *Jurisprudence*, signifies distribution, division, or allotment of certain employments among several persons. Thus the great officers of state, &c. have each their several departments: and the business of the secretaries of state in particular, is generally divided into two partitions; the one officiating for the southern, the other for the northern department: though sometimes another is added on particular occasions.

DEPARTURE, or Departer, in *Law*, a term properly applied to a person, who first pleading one thing in bar of an action, and that being replied to, waves it, and insists on something different from his first plea.

Or, it may be applied to a plaintiff, who, in his replication, shews a new matter different from that in his declaration. (Plowd. 7, 8. 2 Inst. 147.) So if a man plead a general agreement in bar, and in his rejoinder allege a special one, it shall be adjudged a departure in pleading. The defendant hereupon demurreth, because it was a departure from the declaration.

This departure in pleading, if it were allowed, might occasion endless altercation. Therefore the replication must support the declaration, and the rejoinder must support the plea, without departing out of it, as in the case of pleading no award made, in consequence of a bond of arbitration, to which the plaintiff replies, setting forth an actual award: now the defendant cannot rejoin that he hath performed this award; for such rejoinder would be an entire departure from his original plea, which alleged, that no such award was made; therefore he hath now no other choice but to traverse the fact of the replication, or also to demur upon the law of it.

Departure *in despite of the court*, is when the tenant, or defendant, after appearing to the action brought against him, and having a day over in the same term, does not appear at the day, but makes a *default*. This is a *departure in despite of the court;* and therefore he shall be condemned. See Default.

The departure is always on the part of the tenant. or defendant; and its entry is, *Quod prædictus A, licet solemniter exactus, non revenit, sed in contemptum curiæ recessit.*

Departure, in *Navigation*, is the easting or westing of a ship, with respect to the meridian from which it departed or sailed. Or, it is the difference of longitude, either east or west, between the present meridian the ship is under, and that where the last reckoning or observation was made. This departure, any where but under the equator, must be accounted according to the number of miles in a degree proper to the parallel the ship is under. See Sailing.

DEPESTA, in *Antiquity*, a wine vessel which the Sabines, on any festival day, set on the table of their gods.

DEPHLEGMATION, in *Chemistry*. This term is applied to the abstraction of the phlegm, or merely watery part of any substance, and may be performed in several ways. Thus, spirit of wine is dephlegmated by distillation, and the *phlegm* remains in the alembic. Sulphuric acid, on the other hand, is dephlegmated by boiling, and the phlegm rises first, and is dissipated in vapour.

DEPHLOGISTICATED Air. See Oxygen.

Dephlogisticated *Nitrous Air*. See Nitrous Oxyd.

Dephlogisticated *Nitrous Acid*. See Nitrous *Acid*.

DEPILATORY, in *Medicine*, a plaister, or medicine, applied on any hairy place, in order to bring off the hair. The word is formed of the particle *de*, and *pilus*, *hair*.

Depilatories are principally composed of lime and orpiment, which is very caustic, and even a dangerous mineral.

DEPIZNANO, in *Geography*, a town of Naples, in the province of Calabria Citra; three miles S. S. W. of Cosenza.

DEPLOY, in *Military Tactics*, means the expansion of a body of troops, previously compacted in column, &c. so as to offer a larger front; generally for the purpose of performing some evolution, or of arranging a line, or of directing an attack, in some direction least expected by the enemy. This deception is mostly carried into effect by allowing the front to keep its position, or to continue advancing, while the rear divisions open abruptly, (or, if the situation demands, gradually,) so that the enemy remain in a state of incertitude as to the extent and direction of the evolution, until it has been nearly completed, and its intention has been partly effected.

Where an army moves in several columns, it is often expedient to cause their several sub-divisions to deploy, so as to bring the whole into line, either to the front, or to the flank. In performing this evolution, fixed points must be ascertained to direct the march of the several sub-divisions; so that they may all proceed directly to their respective stations, without making any circuitous movements.

The term "deploy" is derived from the French word *deployer*, which signifies to unfold, to open, to expand, or to disclose. The military reader will perceive, that the term is extremely appropriate to the change which takes place from the column to the formation in line.

DEPONENT, Deponens, in the Latin *Grammar*, a term applied to verbs which have active significations, but passive terminations, or conjugations, and want one of their participles passive.

Such is *minor*, *I threaten*, which has for participles *minans*, *minaturus*, and *minatus*, but no *minandus*, which should be the participle passive.

They are called *deponents*, as having deposited, or laid aside their passive signification.

Deponent, in a legal sense, a person who makes a *deposition* or *affidavit*, which see.

DEPOPULATION, the act of wasting, destroying, desolating, or unpeopling a place. Coke, Instit. part. iii. fol. 204.

DEPOPULATORES Agrorum, in our *Statutes*, such as depopulate or dispeople lands.

It appears by the statute 4 Hen. IV. c. 2. that these were great offenders by the ancient law, and that the appeal or indictment against them ought not to be in a general, but in a special manner. They got their name of *depopulatores agrorum*, because by prostrating or decaying the houses and habitations of the king's people, they depopulate towns. Coke, 3 Inst. fol. 204.

DEPORTATION, from *deporto*, *I carry away*, a sort of banishment in use among the Romans, whereby some island, or other place, was allotted to a criminal for the place of his abode, with a prohibition from stirring out of the same upon pain of death.

Ulpian makes this difference between *deportation* and *relegation*; that the former confined the party to one certain place for ever; whereas relegation was frequently revoked, and allowed the exile a little more liberty.

By *deportation* a person lost the rights of a Roman citizen.

DEPOSIT, Depositum, a thing put into the hands of another, to be kept gratis.

The civilians divide *depositum* into *simple* and *judiciary*.

Deposit, *Judiciary*, is that whose property is contested between several persons, and deposited in the hands of some third person, by decree of a judge.

Deposit,

Deposit, *Simple*, is either voluntary, or neceffary. Neceffary is that done in cafe of hoftility, fhipwreck, fire, &c.

Innholders are refponfible for the baggage brought to them, as being a *neceffary depofit.*

DEPOSITARY, in the French law, a perfon entrufted as keeper or guardian of any thing.

Ordinary depofitaries are not to warrant the thing left with them, in cafe it be loft or ftolen. They are only to anfwer for a fraud, or breach of faith; not for negligence. But a *neceffary depofitary*, as an innkeeper, is accountable for a theft or robbery, if there have been any negligence in the cafe: and by the Englifh law, even whether there were any negligence or not.

DEPOSITIO, in *Grammar*, is a name which the Latins gave to the final cadence, which terminates, as it were, the meafure of the verfe. The Greeks called it ἀπόθεσιν, and κατάληξιν. Hence arifeth the diftinction of verfe into four fpecies, *viz. acatalectic, catalectic, brachycatalectic, and hypercatalectic.*

DEPOSITION, Depositio, among the *Ancients*, a ceremony obferved immediately upon a perfon's expiring, and was a folemn manner of laying the corpfe upon the ground. See Burial.

Deposition, in *Geology*. The phenomena of the ftratification obfervable in the cruft of the earth, can leave no manner of doubt, that the fame was formed by matters depofited or precipitated from a fluid, in which the whole was once immerfed; on this point almoft all writers are now agreed, and their principal differences of opinion arife on the manner of this depofition, that is, whether the fame was mechanical, and the matters depofited, only the ruins or detritus of former mountains or ftrata, or precipitations in confequence of recent chemical unions in the fuperincumbent fluid; or, whether both of thefe caufes have not operated, and perhaps at the fame period of time. It may fairly perhaps be obferved, that the exiftence of the primeval mountains, whofe difintegration is fuppofed above in many cafes, never has been and never can be proved, and that the phenomena of the endings of the ftrata are altogether irreconcileable with mechanical depofition, the Britifh ftrata being found to fall fhort of each other in extent weftward, as the feries is afcended, and none of the matter peculiar to any one ftratum is found depofited upon the endings of the inferior ftrata: the chalk ftrata for inftance, and in a certain determinate line, paffing through or near to Wantage, Watlington, Prince-Rifborough, Wendover, Tring, Ivinghoe, Dunftable, Hitchin, Baldock, Royfton, &c. and beyond this line to the north-weftward, no beds of chalk are found (in Britain at leaft,) covering the vaft fucceffion of ftrata, whofe fituations are lower in the feries, and whofe lines of endings are confequently farther to the weftward, although the alluvial or rounded fragments of chalk and its attendant extraneous foffils, are plentifully diftributed on the furface in certain directions, for a great diftance from the endings of the chalk ftrata, indicate the exiftence of vaft tides or inundations, proceeding from the S.E. towards the N.W. over even the higheft hills, at a period fubfequent to the depofition and hardening of the ftrata. (See Satellitic *Tides*.) That chemical affinities acted, both in the formation of the feveral fubftances themfelves in the univerfal fluid or ocean, and alfo in this depofition upon the plane of the ftratum laft depofited, in preference to any other part of the bottom of the fluid, feems very evident, and it feems alfo, that thefe affinities have been further active in fome particular ftrata, in forming vaft accumulations of particular matters, within the limits of the ftrata in which they are imbedded, and with which they are coeval: that curious affemblage of ftrata, called, in our article Coal, the "red earth" for inftance, has in fome inftances vaft concretions or accumulations of rock-falt in it, as at the Wyches in Chefhire and Worcefterfhire; in other inftances gypfum is imbedded therein, as in various parts of Nottinghamfhire, Derbyfhire, &c.; and the recent obfervations of Mr. Farey, a pupil of Mr. Smith's, feem to render it more than probable, that the vaft accumulation or cryftals of fienite and flate, which abound in Charnwood Foreft in Leicefterfhire, are concretions in thefe fame ftrata of red earth, as thofe of the Malvern hills and other places alfo probably are. See Strata.

Deposition, in *Law*, a teftimony given in court by a witnefs upon oath.

In chancery, depofition is a teftimony fet down in writing, by way of anfwer to the interrogatories exhibited in chancery, where fuch witnefs is called *deponent.*

For the purpofe of the examination of witneffes, interrogatories are framed, or queftions in writing; which, and which only, are to be propofed to the witneffes in the caufe. Thefe interrogatories muft be fhort and pertinent; not leading ones; (as, "did you not fee this," or, "did you not hear that?") for if they be fuch, the depofitions taken upon them will be fuppreffed, and not fuffered to be read. For the examination of witneffes in or near London, there is an "Examiner's Office" appointed; but for fuch as live in the country, a commiffion (fee Commission) to examine witneffes is ufually granted to four commiffioners, two named of each fide, or any three or two of them, to take the depofitions there. And if the witneffes refide beyond fea, a commiffion may be had to examine them there upon their own oaths, and (if foreigners) upon the oaths of fkilful interpreters. And it hath been eftablifhed (Atk. 21.) that the depofition of an heathen, who believes in the Supreme Being, taken by commiffion in the moft folemn manner, according to the cuftom of his own country, may be read in evidence. The commiffioners are fworn to take the examinations truly and without partiality, and not to divulge them, till publifhed in the court of chancery; and their clerks are alfo fworn to fecrecy. The witneffes are compellable by procefs of fubpœna, as in the courts of common law, to appear and fubmit to examination. When their depofitions are taken, they are tranfmitted to the court with the fame care that the anfwer of a defendant is fent. When all the witneffes are examined, then, and not before, the depofitions may be publifhed; by a rule to pafs publication; after which they are open for the infpection of all parties, and copies may be taken of them. After a witnefs is fully examined, the examinations are read over to him, and the witnefs is at liberty to alter, or annul any thing, after which he figns them, and then, but not before, the examinations are complete, and are deemed good evidence. (1 P. Wms. 415.) The fame practice prevails in the commons, in ecclefiaftical caufes.

Depofitions in the chancery, after a caufe is determined, may be given in evidence in a trial at bar in B. R. in a fuit for the fame matter, between the fame parties, if the party that depofed be dead; but if he be living, he muft appear in perfon in court to be examined. (1 Lil. Abr. 445.)

Depofitions of informers, &c. taken upon oath before a coroner, upon an inquifition of death; or before juftices of peace on a commitment or bailment of felony, may be given in evidence at a trial for the fame felony; if

if it be proved on oath that the informer is dead, or unable to travel, or kept away by the procurement of the prifoner; and oath muft be made, that the depofitions are the fame that were fworn before the coroner or juftice, without any alteration. (2 Hawk. P. C.) Depofitions taken before a coroner cannot be given in evidence upon an appeal for the fame death; becaufe this is a different profecution from that in which they were taken:—and it has been adjudged, that the evidence given by a witnefs at one trial, could not, in the ordinary courfe of juftice, be made ufe of againft a criminal, on the death of fuch witnefs, at another trial. (2 H. P. C.) The depofitions of witneffes abroad, and of fuch are aged or going abroad *de bene effe*, to be read in evidence, if the trial could be deferred till after their death or departure, are now frequently effected by mutual confent in trials at common law, if the parties are open and candid; and this may be done indirectly at any time, through the channel of a court of equity. When the caufe of action arifes in India, and a fuit is brought upon it in any of the courts of Weftminfter, the court may iffue a commiffion to examine witneffes upon the fpot, and tranfmit the depofitions to England. Stat. 13 Geo. III. c. 63.

Deposition is alfo ufed for the fequeftering, or depriving a perfon of his dignity and office.

This depofition only differs from abdication, in that the latter is fuppofed voluntary, and the act of the dignitary, or officer himfelf; and the former of compulfion, being the act of a fuperior power, whofe authority extends thereto. Accordingly, fome fay the depofition, and fome the abdication of king James II.

Depofition does not differ from deprivation: we fay indifferently, a depofed, or deprived bifhop, official, &c. See Deprivation.

Depofition differs from fufpenfion, in that it abfolutely and for ever ftrips or divefts a prieft, &c. of all dignity, office, &c. whereas fufpenfion only prohibits, or reftrains, the exercife thereof.

Depofition only differs from degradation, in that the latter is more formal, and attended with more circumftances, than the former; but in effect and fubftance they are the fame; thofe additional circumftances being only matter of fhow, firft fet on foot out of zeal and indignation, and kept up by cuftom, but not warranted by the laws or canons. See Degradation.

DEPOT. This term, when applied to military matters, fignifies a depofit, or referve for ftores, provifions, &c. alfo a ftation for the reception, and training of recruits. The difficulty of removing large quantities of ammunition, &c. on emergency, added to the great diftrefs occafioned to armies, whether victorious or defeated, by the removal of depots from the vicinity of their *points d'apui*, (which are generally towns ftrongly fortified, or *corps de referve* pofted in the moft advantageous manner,) fhews the abfolute neceffity for rendering depots fufficiently ftrong to maintain themfelves for fome weeks at leaft, againft even a very powerful force. The immenfe importance attached to the fupplies of whatever an army may, from time to time, ftand in need of, has been long underftood on the continent, where every ftrong hold is a depot, furnifhed according to its fituation, extent, and ftrength, with all thofe articles indifpenfible to an army taking the field. Some of thefe are capable of maintaining a garrifon of 30,000 men for a whole year; befides providing arms, ammunition, and camp equipage, for an army of double that number. The great arfenal at Ulm was of this clafs, but was nearly exhaufted at the time of its furrender, when general Mack fo ignominoufly loft the flower of the Auftrian army.

A depot fhould be built in a peculiar manner: that is, it fhould contain an immenfe pile of bomb-proof buildings, of which the loweft tier fhould be referved for the prefervation of provifions requiring to be kept cool; this ought to be below the furface of the area; the ground-floor fhould be allotted to artillery, and ordnance ftores, the walls and piers being furnifhed with ftrong wooden battens, (projecting a little to obviate the danger of damp,) for the fupport of mufquets, carabines, piftols, fwords, halberts, bayonets, pikes, and every defcription of fmall arms. The fecond floor fhould be devoted to the receipt of camp equipage, and the upper to the lodgment of ready filled cartridges. The great magazines for powder fhould be feparate: the whole of the principal, or body of the place, fhould be cafemated for the accommodation of troops, and pierced (though perhaps mafked) for the reception of heavy cannon. The whole of the outworks fhould be of the beft materials, and on the moft compact fyftem of defence.

Ten fuch depots, advantageoufly fituated, each capable of fupplying ftores, &c. to an army of 50 or 60 000 men; and demanding not more than 5000 for their defence, refpectively, would give a moft defireable acceffion of ftrength to our national defence; and, in the moment of doubtful conteft, infpire our armies with confidence. At prefent we do not perceive, throughout the kingdom, any depot capable of affording fuch fupplies, or of refifting even a moderate force, for fuch a time as might either enable a difcomfited corps to rally, or diftant ones to afford them relief.

DEPRECATION, from *deprecor, I intreat*, in *Rhetoric*, a figure whereby the orator invokes the aid or affiftance of fome one; or prays for fome great evil or punifhment to befall him who fpeaks falfely, either himfelf or his adverfary.

DEPRECATORY, or Deprecative, in *Theology*, a term applied to the manner of performing fome ceremonies in the form of prayer.

Among the Greeks, the form of abfolution is deprecatory; being conceived in thefe terms, *May God abfolve you!* whereas in the Latin, and even in fome of the reformed churches, it is in the declarative form, *I abfolve you.*

DEPRESSED Leaf, in *Botany*. See Leaf.

DEPRESSION *of Equations*, in *Algebra*. See *Equation*.

Depression *of the Pole*, in *Aftronomy*. So many degrees as you fail, or travel from the pole towards the equator, fo many you are faid to deprefs the pole, becaufe it becomes refpectively fo much lower or nearer to the horizon.

Depression. If the zenith diftance of an object exceeds 90°, its excefs above that quantity, or its angular diftance from the horizon, is called the depreffion.

In nautical obfervations it is neceffary to know the depreffion or dip of the fea, to correct the apparent altitude of an obferved object.

In trigonometrical furveys it is by means of the obferved depreffion that the height of one ftation above the level of the other is computed, and likewife the quantity of the terreftrial refraction.

The method of calculating thefe depreffions is founded on this theorem. The fum of the depreffions of two objects, as feen reciprocally from each other, is equal to the arc they intercept on the furface of the earth.

Let A, B (*Pl.* IX. *Aftronomy*, *fig.* 61.) be two ftations unequally diftant from the centre of the earth C; $A'BA$, $B'AB$, their depreffions below their refpective horizons, it is evident, that fince both the $\angle C$ and the fum of the angles $A'BA$ and $B'AB$ are complements of the angle C to two right angles, the angle $C = \angle A'BA + \angle B'AB$.

The

The following method is given by Delambre for finding the quantity of terreftrial refraction.

Let C be the centre of the earth (*Pl.* IX. *Aftronomy, fig.* 62.), A and B two fignals. If from the point A, we obferve the point B, it will appear at B′, by the effect of the refraction; the point A will, when feen from B, for the fame reafon appear at A′.

Let the apparent zenith diftances

$$Z\,A\,B' = \delta \text{ and } V\,B\,A' = \delta'$$

and the angles of refraction,

$$B\,A\,B' = r \quad A\,B\,A' = r'$$

The true zenith diftances will be

$$Z\,A\,B = \delta + r = D$$
$$V\,B\,A = \delta' + r' = D'.$$

Therefore $Z\,A\,B + V\,B\,A = \delta + \delta' + r + r'$. (1)

And becaufe the fum of the exterior angles of a triangle is equal to the two interior and oppofite

$$\angle Z\,A\,B = C + A\,B\,C$$
$$\angle V\,A\,B = C + B\,A\,C,$$

and $Z\,A\,B + V\,B\,A = 180° + C = D + D'$. (2)
and $\delta + \delta' + r + r' = 180° + C$;
fince r is nearly equal r'

$$r = \frac{C}{2} - \tfrac{1}{2}(\delta + \delta' - 180). \quad (3)$$

$$\frac{r}{C} = \frac{\frac{1}{2}C - \frac{1}{2}(\delta + \delta' - 180)}{C} = n. \quad (4)$$

and $r = n\,C$.

The quantity n varies extremely, according to the ftate of the atmofphere. In the trigonometrical furvey it was found to vary from $\frac{1}{4}$ to $\frac{1}{20}$. The mean may be taken $\frac{1}{12}$ or $n = 0.08$. From the above equations we obtain

$$\angle Z\,A\,B = \delta + r = 90° + \tfrac{1}{2}C + \tfrac{1}{2}(\delta - \delta').$$
$$\angle V\,B\,A = \delta' + r' = 90° + \tfrac{1}{2}C + \tfrac{1}{2}(\delta - \delta').$$

Example.

Let δ be equal to 90° 15′ 30″.
δ' 89 57 50.
K the diftance between the two fignals = 93.522 feet.

Firft find ∠C	Log. K =	4.97091
	R =	5.31442
Co-log. ρ the mean radius of the earth	ρ =	2.68000
	923″.8 =	2.96533
Angle C	=	15′ 23″.8

$\delta = 90°\ 15'\ 30''$
$\delta' = 89\ \ 57\ \ 50$
$\delta + \delta - 180 = 0\ \ 13\ \ 20$
$\frac{\delta + \delta - 180}{2} = 0\ \ 6\ \ 40$
$\frac{C}{2} = 7\ \ 42$
$r = nC = 1'\ 2''$

Log. r (62″) = 1.79239
Co-log. C = 7.03466
$n = 0.067$ = 8.82705

To find the difference in the heights of two ftations above the level of the fea, by obferving their depreffions.

Let C be the centre of the earth confidered as a fphere, A, B, two points unequally diftant from the centre. If A B′ is a true level line or terreftrial arc, B B′ = H will be the difference of the level of the two points A and B. If, moreover, $Z\,A\,B = D = \delta + r$ be the true zenith diftance of the point B, then, fince $B'A\,C = 90° - \frac{1}{2}C$.

$B\,A\,B' = 180° - Z\,A\,B - B'A\,C = 180° - D - 90° + \frac{1}{2}C = 90° - D + \frac{1}{2}C$.

$A\,B\,B' = A\,B'C - B\,A\,B' = 90° - \frac{1}{2}C - 90° + D - \frac{1}{2}C = D - C$.

In the triangle B A B′ making A B′ = K.

$$H = \frac{K\,\text{fin.}\,A}{\text{fin.}\,B} = \frac{K\,\text{fin.}(90° + \frac{1}{2}C - D)}{\text{fin.}\,(D - C)} = \frac{K\,\text{cof.}(\frac{1}{2}C - D)}{\text{fin.}\,(D - C)}. \quad (1.)$$

If we fuppofe the angle B′ a right angle, then we fhall have very nearly

$$H = K\ \text{cot.}\ (\delta + r - \tfrac{1}{2}C). \quad (2.)$$

Relatively likewife to the level of the point A.

$$H = -K\ \text{cot.}\ (\delta' + r - \tfrac{1}{2}C).$$

If we employ the expreffion $H = K\,\text{cot.}\ (\delta' + r - \frac{1}{2}C)$ it will be relatively to the point B.

It has been demonftrated above, that

$$Z\,A\,B = 90° + \tfrac{1}{2}C + \tfrac{1}{2}(\delta - \delta')$$
$$V\,B\,A = 90° + \tfrac{1}{2}C - \tfrac{1}{2}(\delta - \delta)$$

therefore, $B\,A\,C = 180° - Z\,A\,B = 90° - \frac{1}{2}C + \frac{1}{2}(\delta - \delta')$

$$B'A\,C = 90° - \tfrac{1}{2}C.$$
$$B\,A\,B' = B\,A\,C - B'A\,C = \tfrac{1}{2}(\delta' - \delta)$$
$$B'B\,A = 180° - V\,B\,A = 90° - \tfrac{1}{2}C - \tfrac{1}{2}(\delta - \delta')$$

$$\text{and } H = \frac{K\ \text{fin.}\ B\,A\,B'}{\text{fin.}\ A\,B\,B'} = \frac{K\ \text{fin.}\ \frac{1}{2}(\delta' - \delta)}{\text{cof.}\ \frac{1}{2}(\delta' - \delta + C)}. \quad (4.)$$

This formula is exact, but we may often take $\frac{1}{2}C = 0$, then, fince $\frac{\text{fin.}}{\text{cof.}} = \text{tang.}$

$$H = K\ \text{tang.}\ \tfrac{1}{2}\,(\delta' - \delta). \quad (5.)$$

Hence, we may obtain the height of a ftation above the level of the fea, by obferving, when it is vifible, the horizon of the fea. For let A B be a tangent from the obferver at B to the fea at A. Let C A = ρ, B B′ = N.

Then, in the triangle C A B,

$$C\,B = \frac{\rho}{\text{fin.}\ (90° - C)} = \frac{\rho}{\text{cof.}\ C}.$$

$$B\,B' = N = \rho\left(\frac{1 - \text{cof.}\ C}{\text{cof.}\ C}\right);$$

but $1 - \text{cof.}\ C = \text{fin.}\ C\ \text{tang.}\ \frac{1}{2}C$,

therefore, $N = \rho\ \text{tang.}\ C\ \text{tang.}\ \frac{1}{2}C$:

Alfo, $C = 90° - B = 90° - (180 - D) = D - 90°$, and $D = \delta + r$. Therefore, $N = \rho\ \text{tang.}\ (\delta + r - 90°)\ \text{tang.}\ \frac{1}{2}(\delta + \rho - 90°)$. When r is unknown, it may be deduced from the equation $r = n\,C$.

But in practice it will be more convenient to transform N into fome function of n, which may be effected thus.

$C = \delta - 90°$; neglecting the refraction, which may be done without fenfible error, then $r = n\,C = n\,(\delta - 90°)$; fubftituting this laft value in equation, (6.) and recollecting that tang. $m\,r$ = m tang. x, when x is very fmall, and m does not much exceed unity, we fhall have

$$N = \tfrac{1}{2}\rho\ \text{tang.}^2\ (\delta - 90° + n)(\delta - 90°) = \tfrac{1}{2}\rho\ \text{tang.}^2\ \big((1 + n)(\delta - 90°)\big)$$ and very nearly

$$N = \tfrac{1}{2}\rho\ (1 + n)\ \text{tang.}^2\ (\delta - 90°). \quad (7.)$$

Example I.

At the ftation A, the zenith diftance of the point B was obferved 90° 15′ 30″; and at the ftation B, the zenith diftance of A was obferved 89° 57′ 50″, the diftance from A to B 93,522 feet; required the height of A above the level of B.

1ft. By the exact formula $H = \frac{K\ \text{fin.}\ \frac{1}{2}(\delta' - \delta)}{\text{cof.}\ \frac{1}{2}(\delta' - \delta + C)}$.

$\delta' =$

$$\delta' = 89^\circ\, 57'\, 50''$$
$$\delta = 90\ \ 15\ \ 30$$
$$\delta' - \delta = -\ 17\ \ 40$$
$$C = +\ 15\ \ 24$$
$$\delta' - \delta + C = -\ \ 2\ \ 16 = p.$$

$$\text{Log. fin. } \tfrac{1}{2}\, \delta' - \delta' = -\ 7.40985$$
$$\text{Log. K} \qquad = +\ 4.97091$$
$$\text{Cof. } \tfrac{1}{2} p \qquad 0.00000$$
$$-\ 240.3 = \quad 2.38076$$

Therefore, B is 240.3 feet below the level of A.

Example II. *by formula* (5.).

$$\text{Log. K} \quad = 4.97091$$
$$\text{Tang. } \frac{\delta' - \delta}{2} = 7.40985$$
$$2.38076 = 240.3 \text{ feet as above.}$$

Example III.

When only δ is given. Equation (2.)

Let $n = 0.067$,

$$H = \text{K cot. } (\delta + 0.67\ C - 0.5\ C),$$
$$= \text{K cot. } (\delta + .433\ C)$$
$$\delta \qquad = 90^\circ\, 15'\, 30''$$
$$-\ 433\ C = \qquad 6\ \ 40$$
$$8\ \ 50$$

$$\text{Log. tang. } 8'\, 50'' = 7.40985$$
$$4.97091$$
$$2.38076 = 240.3 \text{ feet.}$$

Example IV.

To find the height of a ftation, by obferving the depreffion of the horizon of the fea.

Let the obferved depreffion be 15′ 25″, required the height of the obferver above the level of the fea.

$$N = \tfrac{1}{2} \varrho\ (1 + n)^2 \text{ tang.}^2\ (\delta - 90^\circ).$$

$$\left.\begin{array}{ll} \text{Log. } 0.5 & = 9.69897 \\ \text{Log. } \varrho & = 7.32000 \\ \text{Log. } (1.08)^2 & = 0.06685 \end{array}\right\} 7.08582.$$
$$\text{Log. tang.}^2\ 15'\, 25'' = 5.30344$$
$$2.38926 = 245 \text{ feet.}$$

The three firft terms being conftant, we have the following rule.

To the conftant log. 7.08582 add twice the log. of the tangent of the depreffion, and the fum will be the logarithm of the number of feet required.

If the height of the obferver be given, and the depreffion is required, then the rule will be to the log. of the height in feet, add the conftant log. 2.91418, and add likewife ten to the index, then half this fum will be the log. tangent of the depreffion required.

Example.

Let the height of the obferver be 100 feet, required the depreffion.

$$\text{Log. } 100 \quad - \quad 2.00000$$
$$\text{Conft. log.} \quad - \quad 2.91418$$
$$14.91418$$
$$\text{Log. tang. of the Depreffion} = 9'\, 5'' - 7.45709$$

Let the height of the obferver be 245 feet.

$$\text{Log. } 245 \quad 2.38916$$
$$\text{Conft. log.} \quad 2.91418$$
$$5.30334$$
$$\text{Log. tang.} \quad 7.65167 = 15'\, 25'' = \text{depreffion}$$

required, the fame as in Mr. Mendoza's table.

Having found the depreffion for one foot = 59″.1, a table may be conftructed by multiplying 59″.1 by $\sqrt{}$height of the obferver.

Example.

$$\text{Log. } 59''.1 \quad 1.77150$$
$$\tfrac{1}{2}\ \text{Log. } 245 \quad 1.19458$$
$$2.96616 = 925'' = 15'\, 25.$$

The fame as above.

Table of the Depreffion of the Horizon of the Sea.

Height of the Eye in Feet.	Dip. of the Horizon.	Height of the Eye in Feet.	Dip. of the Horizon.	Height of the Eye in Feet.	Dip. of the Horizon.	Height of the Eye in Feet.	Dip. of the Horizon.
	′ ″		′ ″		′ ″		′ ″
1	0 59	38	6 4	143	11 46	250	15 34
2	1 24	41	6 18	146	11 54	255	15 44
3	1 42	44	6 32	149	12 1	260	15 53
4	1 58	47	6 45	152	12 8	265	16 2
5	2 12	50	6 58	155	12 15	270	16 11
6	2 25	53	7 10	158	12 22	275	16 20
7	2 36	56	7 22	161	12 29	280	16 29
8	2 47	59	7 34	164	12 36	285	16 37
9	2 57	62	7 45	167	12 43	290	16 46
10	3 7	65	7 56	170	12 50	295	16 55
11	3 16	68	8 7	173	12 57	300	17 3.5
12	3 25	71	8 18	176	13 4	325	17 45
13	3 33	74	8 28	179	13 10	350	18 25
14	3 41	77	8 38	182	13 17	375	19 4
15	3 49	80	8 48	185	13 23	400	19 42
16	3 56	83	8 58	188	13 30	425	20 18
17	4 4	86	9 8	191	13 36	450	20 53
18	4 11	89	9 17	194	13 43	475	21 28
19	4 17	92	9 26	197	13 49	500	22 1
20	4 24	95	9 36	200	13 55		
21	4 31	98	9 45	203	14 2	550	23 6
22	4 37	101	9 54	206	14 8	600	24 7.5
23	4 43	104	10 2	209	14 14	650	25 5
24	4 49	107	10 11	212	14 20	700	26 3
25	4 55	110	10 19	215	14 26	750	26 58
26	5 1	113	10 28	218	14 32	800	27 51
27	5 7	116	10 36	221	14 38	850	28 43
28	5 3	119	10 44	224	14 44	900	29 35
29	5 18	122	10 52	227	14 50	950	30 19
30	5 24	125	11 00	230	14 56	1000	31 9
31	5 29	128	11 8	233	15 2	1500	38 8.5
32	5 34	131	11 16	236	15 7	2000	44 2.5
33	5 39	134	11 24	239	15 13	3000	53 56
34	5 44	137	11 31	241	15 19	4000	1 2 17.5
35	5 49	140	11 39	245	15 25	5000	1° 9′.38

The formulæ on a fpheroid would be a little different from the above, but the corrections are too fmall to be of any practical

practical utility. Neverthelefs, it will be advifeable in delicate inveftigations, to attend to the nature of the curvature between the two ftations. This may be eafily done by the tables inferted under the article Degree, where the radius of curvature is given both for the meridional and perpendicular degree.

Example. Let the latitude = 50°

Required the depreffion at 5000 feet elevation in the direction eaft or weft; and likewife north and fouth.

East or Weft.		North or South.	
Log. 0.5 - =	9.69897	Log. 0.5 - =	9.69897
Log. n - =	7.32128	Log. rad. - =	7.32021
Log. $(1.08)^2$ =	0.06685	Log. $(1.08)^2$ =	0.06685
	7.08710		7.08603
Its com. -	2.91290	Its com.	2.91397
Log. 5000 - =	3.69897	Log. 5000 -	3.69897
	16.61187		16.61294
Tang. 1° 9′ 32″ =	8.30593	Tang. 1° 9′ 37″ =	8.30647

Depression *of the fun*, or *of a ftar*, is its diftance from the horizon, below it, meafured by an arch of the vertical circle, intercepted between it and the horizon.

Depression, in *Geology*, fignifies either a lower part of fmall extent, in a ftratum, as Dr. Townfon defines the term, with reference to his figure, Philofophy of Min. p. 221; or, it fignifies thofe greater depreffions, or finkings down, which appear in the ftrata. Many of thefe, it muft be obferved, are rather a rifing up, or elevation of the furrounding ftrata, than an actual finking down of the part, faid to be depreffed. M. Sauffure has fuppofed, that the lake of Geneva in Switzerland, occupies the place of a depreffed, or funken mafs of primitive rock; becaufe the furrounding ftrata rife towards the lake. This, we fuppofe, to be no uncommon cafe, but that fo much of the Englifh channel as lies oppofite to the coaft, between the chalk ftrata at Dover, and at Beachy-Head, and the greater part of the Briftol channel, may be confidered as owing to depreffions of the ftrata, which occupy the bottoms of thofe feas. See Elevation *of Strata*, and Absorption *of Mountains*.

Depression, in *Surgery*, is the finking inwards of the fkull, fo as to prefs down upon the brain. This takes place when fome part of the cranium has been injured by external violence. We have mentioned the fymptoms arifing from this caufe, under the article Compression, to which the reader is therefore referred. See Trepanning, and *Injuries of the* Head.

DEPRESSOR, in *Myology*, a name given to feveral mufcles, which have the power of drawing down the parts, in which they are inferted.

Depressor *alæ nafi*, one of the mufcles attached to the cartilaginous part of the nofe. It is the depreffor labii fuperioris proprius of Douglas, l'incifif moyen of Winflow, l'abaiffeur du nez of Bichat. It arifes from the fuperior maxillary bone in front of the incifor and canine teeth, and afcends in a ftraight direction, to be inferted into the ala of the nofe, where its fibres are mingled with thofe of the compreffor naris, and of the levator labii fuperioris et alæ nafi.

It draws down the ala of the nofe, and the neighbouring part of the upper lip, which it preffes againft the teeth.

Depressor *anguli oris*, one of the mufcles of the mouth; for the defcription of which, fee Deglutition.

Depressor *labiorum communis*; a name given by fome to the depreffor anguli oris, which fee.

Depressor *labii fuperioris alæque nafi*. See Depressor *alæ nafi*.

Depressor *labii fuperioris proprius*. See Depressor *alæ nafi*.

Depressor *labii inferioris*, a mufcle of the lower lip, defcribed alfo by the name of quadratus; for its defcription fee the account of the mufcles of the lips, in the article Deglutition.

Depressor *oculi*, a name which has been fometimes given to the inferior ftraight mufcle of the eye. See Eye.

Depressor *maxillæ inferioris*, a name of the digaftricus mufcle; for the defcription of which, fee the article Deglutition.

DEPRIMENS, in *Anatomy*, a term applied to fome mufcles which deprefs or draw down parts.

Deprimens *biventer*. See Digastricus.

Deprimens *humerum rotundus*, a name given by Spigelius to the teres major, which fee.

Deprimens *oculi*, the inferior ftraight mufcle of the eyeball. See Eye.

DEPRIVATION, in the *Canon Law*, the act of bereaving, diverting, or taking away a fpiritual promotion, or dignity: as when a bifhop, vicar, prebend, or the like, is depofed, or deprived of his preferment, for fome matter, or fault, in fact, or in law. See Deposition.

Deprivation is of two kinds; *à beneficio*, & *ab officio*.

Deprivation *à beneficio* is, when for fome great crime or defect a minifter is wholly and for ever deprived of his living, or preferment: which differs from fufpenfion, in that the latter is only temporary.

Deprivation *ab officio*, is when a minifter is for ever deprived of his orders: which is the fame, in reality, with what we otherwife call *depofition* and *degradation*; and is ufually for fome heinous crime deferving death, and is performed by the bifhop in a folemn manner. See Degradation.

Deprivation may alfo take place in confequence of fome particular claufe in an act of parliament. The deprivation of bifhops, &c. is declared lawful by ftatute 39 Eliz. c. 8. By the king's commiffion, in whom the fupremacy is lodged, a bifhop may be deprived; however, the canons direct, that a bifhop fhall be deprived in a fynod of the province: or, if that cannot be affembled, by the archbifhop and 12 bifhops at leaft, not as his affiftants, but as judges. It has been adjudged, that an archbifhop may deprive a bifhop for fimony, &c. for he hath power over his fuffragans, who may be punifhed by the archbifhop's court for any offence againft their duty. (1 Salk. 134.) Deprivation may take place either, firft, by fentence declaratory in the ecclefiaftical courts, for fit and fufficient caufes allowed by the common law; fuch as attainder of treafon or felony (Dyer 108. Jenk. 210.) or conviction of other infamous crimes in the king's courts; for herefy, infidelity, grofs immorality, and the like: or, fecondly, in purfuance of divers penal ftatutes, which declare the benefice void, for fome nonfeafance or neglect, or elfe fome malfeafance or crime; as for fimony (31 Eliz. c. 6. 12 Ann. c. 12.); for maintaining any doctrine in derogation of the king's fupremacy, or of the 39 articles, or of the Book of Common Prayer (1 Eliz. c. 142. 13 Eliz. c. 12.); for neglecting after inftitution to read the liturgy and articles in the church, or make the declarations againft popery, or take the abjuration oath (13 Eliz. c. 12. 14 Car. II. c. 4. 1 Geo. I. c. 6.); for ufing any other form of prayer than the liturgy of the church of England (1 Eliz. c. 2.); or for abfenting himfelf 60 days in one year from a benefice belonging to a popifh patron, to which the clerk was prefented by either of the univerfities (1 W. & M. c. 26.);—

in all which or fimilar cafes the benefice is *ipfo facto* void, without any formal fentence of deprivation, and avoidance by act of parliament, and no declaratory fentence. If any parfon, vicar, &c. have one benefice with cure of fouls, and take plurality, without a faculty or difpenfation; or if he commit wafte in the houfes and lands of the church, called dilapidations; or if he obtained preferment in the church, by fimoniacal contract; thefe have been held good caufes for deprivation of priefts. When a benefice is only voidable, but not void before fentence of deprivation, the party muft be cited to appear; there is to be a libel againft him, and a time affigned to anfwer it, and alfo liberty for advocates to plead, and after all a folemn fentence pronounced; though none of thefe formalities are required, when the living is made *ipfo facto* void. (Can. 122.) If the deprivation be for a thing merely of ecclefiaftical cognizance, no appeal lies; but the party has his remedy by a commiffion of review, which is granted by the king, of mere grace. (Moor. 781.)

DEPTFORD, in *Geography*, is a large populous town, though not invefted with the privilege of a market, in the county of Kent, England. Its name was anciently fpelt *Depēford*, fuppofed to have been derived from a ford, through the Ravenfbourne river at this place. It was alfo formerly called *Deptford Strond* and *Weft Greenwich*. The town confifts of two parifhes, called Deptford St. Nicholas or the Lower Town, and Deptford St. Paul or the Upper Town. The latter was conftituted a diftinct parifh in the year 1730. Deptford was anciently a fmall fifhing village, and continued of comparatively but little importance, till the Royal Dock was eftablifhed here by Henry VIII. in the beginning of his reign. Since that period, it has progreffively increafed; and its population, according to Mr. Lyfons, has augmented in the proportion of twenty to one within the laft two centuries: though a confiderable check was given to its increafe in 1665 and 1666, during which years nearly nine hundred perfons died here of the plague. Deptford fuffered feverely by a fire in 1652; and in 1671 the Lower Town was inundated by a flood which rofe to the height of ten feet in the ftreets near the river, fo that the inhabitants were obliged to retire to the Upper Town in boats: the adjoining marfhes were alfo overflowed, and about feven hundred fheep, with a great number of oxen, cows, &c. were deftroyed.

Deptford is noted for its docks, one of which, called the Royal Dock or King's Yard, was formed, as before obferved, by King Henry VIII., but it has been greatly enlarged and improved fince that period. All its concerns are managed under the immediate infpection of the Navy Board: the refident officers are, a clerk of the cheque, a ftore-keeper, a mafter fhipwright, and his affiftants, a clerk of the furvey, a mafter attendant, a furgeon, and various inferior officers. The number of artificers and labourers employed here in time of war is about 1500: even in time of peace, the general number is upwards of 1000. The whole extent of the yard includes about thirty-one acres, which are occupied by various buildings; two wet docks, a double and a fingle one; three flips for men of war; a bafon; two maft-ponds; a model-loft; maft-houfes; a large fmith's fhop, with about twenty forges for anchors; fheds for timber, &c. The old ftore-houfe is a quadrangular pile, and appears to have confifted originally only of one range of buildings on the north fide; where, on what was formerly the front, is the date 1513, together with the initials H. R. in a cypher, and the letters A. X. for Anno Chrifti. The buildings on the eaft, weft, and fouth fides of the quadrangle have been erected at different times; and a double front, towards the north, was added in 1721. Another ftore-houfe, parallel to the above, and of the fame length, having fail and rigging-lofts, was completed a few years ago; and there is alfo a long range of fmaller ftore-houfes, built under the direction of fir Charles Middleton about the year 1780. The other buildings confift of various workfhops and houfes for officers. Oppofite to the yard, affixed to the fide of a veffel lying at anchor in the river, is a curious machine for removing and hoifting mafts. At a fhort diftance from the King's Yard, clofe to the river, is the Victualling Office, fometimes called the Red Houfe, from its ftanding on the fide of a large range of ftore-houfes, conftructed with red bricks, which was burned down in July 1639, and all its ftores confumed. It was afterwards re-built, and included in the grant of Sayes court to fir John Evelyn in 1726; and was then defcribed as 870 feet in length, 35 wide, and containing 100 warehoufes. A new Victualling houfe was built on the fpot in 1745: this new building was alfo confumed by fire in 1749, with great quantities of ftores and provifions. The immenfe pile which now forms the Victualling Office has been erected at different times fince that period, and confifts of many ranges of building appropriated to the various eftablifhments neceffary in the important concern of victualling the navy. Befides ftore-houfes of various kinds, and dwelling-houfes for the principal and inferior officers, it contains a wind-mill for grinding corn, with granaries, and bake-houfes for making bifcuit, an extenfive cooperage and brewhoufe, fpacious flaughtering-houfes, and houfes for curing beef, pork, &c.

Befides the King's Yard, here are two large private docks for fhip-building, called Dudman's and Barnard's, where men of war of 74 guns are fometimes built. Deptford contains two churches; the oldeft dedicated from time immemorial to St. Nicholas, the patron of fea-faring men; the other to St. Paul. St. Nicholas' church confifts of a nave, chancel, and aifles, with an embattled tower of flint and ftone, of a date long prior to the body of the fabric, which was rebuilt in 1697. The monuments and fepulchral infcriptions are numerous, and many of them record the memory of perfons of celebrity. In the chancel is the monument of Capt. Edward Fenton, who accompanied fir Martin Frobifher in his fecond and third voyages, and had himfelf the command of an expedition for the difcovery of a north-weft paffage. St. Paul's church is a handfome ftone fabric, erected about the year 1730, under the provifions of certain acts paffed in the ninth and tenth years of queen Anne, for the building of fifty new churches in and near London. It confifts of a nave, chancel, and aifles, with a well proportioned fpire at the weft end: the roof is fupported by columns of the Corinthian order. On the north fide of the altar is an elegant mural monument, by Nollekins, in memory of James Sayer, efq. vice-admiral of the white. When the act for the feparation of the two parifhes was paffed in 1730, 3,500*l.* out of the duty on coals was allotted to purchafe lands for the maintenance of the rector of the new church; and it was alfo enacted that the churchwardens fhould pay him 70*l.* in addition, annually, in lieu of burial fees, except when the corpfe is admitted into the church. In Deptford are feveral places of worfhip for congregations of various claffes of diffenters.

The Corporation, or Society of the Trinity Houfe, the meetings of which are now held in a handfome building on Tower Hill, was originally eftablifhed at Deptford in the reign of Henry VIII., and incorporated by the name of "The Mafter, Warden, and Affiftants of the Guild or Fraternity of the moft glorious and undivided Trinity, and of St. Clement, in the parifh of Deptford Strond." The ancient hall, in which the members continued to affemble at this place,

place, was pulled down about the year 1787, on the erection of the Trinity Houfe in London; but here are ftill two hofpitals belonging to the corporation. The penfioners confift of decayed pilots and mafters of veffels and their widows: the annual allowance to the widows and fingle men is about 18*l.*; to the married men about 28*l.* The charitable benefactions of this town are numerous and of confiderable value; in all thofe given prior to the year 1730 both parifhes have a joint intereft.

Various improvements have been made at Deptford fince the twenty-feventh of George II., when an act was paffed for paving and cleanfing the ftreets, and for the better relief and employment of the poor. The bridge over the Ravenfbourne, which was formerly of wood, was rebuilt of ftone at the folecoft of Charles I. in 1628, and hasbeen rendered more commodious of late years, at the expence of the parifhioners. Here, previous to the battle of Blackheath, in the reign of Henry VII., was a fkirmifh between lord Dawbeney's army, and "certayne arches of the rebelles, whofe arrowes," as is reported, fays Hall, "were in length a full yerde." The inhabitants of Deptford are chiefly thofe employed in the dock-yards, or engaged in maritime purfuits of different kinds: the number in both parifhes, as returned under the act of 1801, was 17,548; the number of houfes 3,139: but they have been fomewhat increafed fince that time. An extenfive manufacture of earthen ware, called Deptford ware, is carried on in this town. The manor houfe of Deptford, with its furrounding eftate, which had obtained the name of Sayes court from its being long in the poffeffion of the Sayes, became in 1651 the refidence of John Evelyn, efq. the celebrated author of the "Sylva," whofe gardens at this place are faid to have been the wonder and admiration of the moft judicious men of his time. Mr. Evelyn died in 1706. The houfe and gardens were afterwards entirely neglected, and there is not now the leaft trace of either. The prefent workhoufe was built on the fite in the year 1729. Lyfons' Environs of London. Halfted's Hiftory of Kent: and the Beauties of England and Wales, vol. vii.

Deptford, a town of America, in Gloucefter county, New Jerfey.

DEPTH, in *Geometry*, &c. See Altitude, Elevation, &c.

Depth *of a Sail*, denotes the extent of any fquare or oblong fail from the head-rope to the foot-rope; or the length of the after-leech of any boom-fail or ftay-fail.

Depth *of a Squadron*, or *Battalion*, is the number of men in a file, or the number of ranks. Infantry is now generally drawn up three deep, and in the defence of a breaft-work only two deep. The cavalry is commonly drawn up three deep, and fometimes only two deep. See Rank.

DEPURANTIA, in the *Materia Medica*, medicines fuppofed to correct or evacuate the impurities which, upon any occafion, prevail in the body; but as no fuch fpecific power is known in any particular medicine, except, perhaps, in mercury, in the cure of fyphilis, the general term is groundlefs and improper, and is now exploded by medical writers.

DEPURATION, from *depurgo*, *I purify*, in *Pharmacy*, the fame as clarification, or purification; *viz.* the purging a body of all the lees, fæces, and other crafs, coarfe, and excrementitious parts contained therein.

Fermentation ferves to depurate liquors: fyrups, juices, &c. are depurated by paffing them through the manica Hippocratis, or ftraining-bag. See Clarification.

DEPURATORIA Febris, in *Medicine*, a fever thus called by the illuftrious Sydenham, which prevailed much in the years 1661, 2, 3, 4. This, fays he, feems to be the only one, as far as I could hitherto obferve, in which nature regulated all the fymptoms in fuch a manner, as to fit the febrile matter, prepared by proper concoction, for expulfion in a certain time, either by a copious fweat, or a freer perfpiration, and upon this account I call it the depuratory fever: and in reality, continues he, I am inclined to believe, that this is the capital and primary fever of nature, as well with refpect to the regular method which nature ufes in promoting and accomplifhing the digeftion of the morbific matter at the appointed time, as alfo becaufe it occurs more frequently than other fevers. It feems alfo reafonable to think, that the neceffary and excellent rules left us by Hippocrates and other ancient phyficians, are adapted to this primary fever; by means of which it is to be regulated in fuch a manner, that the febrile matter may be prepared to make a proper crifis by fweat.

DEPUTATION, from *deputare*, *to depute*, a miffion of certain felect perfons out of a company, or body, to a prince, or affembly, to treat of matters in their name, or to profecute fome affair therein.

Deputations are more or lefs folemn, according to the quality of thofe who fend them, and the bufinefs they are fent upon.

Deputation is not properly applied where a fingle perfon fends another with fuch commiffion; but only where a body are concerned. The parliament deputed the fpeaker, and fix members to prefent their addrefs to his majefty. The chapter deputed two canons to folicit their affair in council.

DEPUTATUS, among the *Ancients*, was applied, firft, to armourers, or workmen employed in the making of armour in the forges, &c. And fecondly, to a fort of active people, who followed the army, and in engagements were trufted to bring off, and take care of the wounded.

Deputatus, Δεπουτατος, was alfo an inferior officer in the church of Conftantinople, whofe bufinefs was to call perfons of condition the patriarch had a mind to fpeak with, and to keep off the crowd where that prelate walked.

This deputy appears to have been a fort of ufher, or tipftaff; but he had likewife the care of the facred veftments, in which he approached the office of a facriftan.

DEPUTY, a perfon fent, or deputed, by fome community in their name and behalf.

Deputy is alfo frequently ufed among us for an office, or employ, not a dignity; and ftands indifferently for a vice, or lieutenant.

Deputy, in *Law*, is one who exercifes an office in another's right: and the forfeiture or mifdemeanor of fuch deputy fhall caufe the perfon whom he reprefents to lofe his office. A principal officer may not appoint a deputy in all cafes, unlefs the grant of the office will juftify him in fo doing; but when an office defcends to an infant, ideot, &c. he may make a deputy of courfe (9 Rep. 47.). A fuperior officer muft anfwer for his deputy in civil actions, but not in criminal cafes (2 Inft. 191. 466.) Judges have no power to hold their courts by deputy (2 Hawk. P. C. c. 1. § 9.): recorders, however, may do it (1 Lev. 76.). Coroners cannot appoint deputies, becaufe theirs is a judicial office of truft, annexed to their perfons (1 Lil. 446.). Sheriffs, ftewards of a court, bailiffs of a liberty, and conftables, are allowed to appoint deputies (Cro. Eliz. 534. 2 Danv. 482.).

Deputy *Rock*, in *Geography*, a fhoal in the found of Copland, near the north-eaft coaft of Ireland, nearly half way between the fouth end of Copland ifland, and Donaghadee, on which the leaft water is eight feet. Latitude 54° 38'. Long. 5° 24' W. from Greenwich.

DE QUIBUS *fur disseisin*, in *Law*, a writ of entry. See Fitzherb. Nat. Brev. fol. 191.

DER, a fyllable frequently prefixed to the names of places in England. It is faid to fignify that fuch were formerly places, where wild beafts herded together, fo called from the Saxon *deor*, *fera*, unlefs the fituation was near fome river.

Der, in *Geography*, a town of Egypt; 11 miles S. of Siut.

DERA, in *Ancient Geography*, a country of Iberia, watered by the river Sicanus. Steph. Byz.—Alfo, a town of Afia, in the interior of Sufiana.

DERAIGN. See Dereyn.

DERANOBILA, in *Ancient Geography*, a town of Carmania.

DERASNIA, in *Geography*, a town of Poland, in the palatinate of Bracklaw; 68 miles N. W. of Bracklaw.

DERAZINA, a town of Poland, in the palatinate of Lucko; 28 miles N. E. of Lucko.

DERBE, in *Ancient Geography*, a city of Afia Minor, in Lycaonia, near Ifauria. M. d'Anville places it near a fmall chain of mountains, detached from Taurus in the country of Ifauria called Antiochiana. It is mentioned in the New Teftament, Acts xiv. 6. It was the feat of Antipater Derbæus, and the country of Timothy.

Derbe, in *Geography*, a town of Piedmont, in the duchy of Aofta; 10 miles W. of Aofta.

DERBENT, or Derbend, a city of Perfia, in Daghestan, fituated on the weft coaft of the Cafpian fea, and having a harbour; though the worft on this fea, becaufe veffels can feldom approach the fhore, on account of fands and fhoals, but are obliged to anchor at the diftance of $\frac{3}{4}$ of a mile; the commerce is therefore inconfiderable, and the port is little frequented. It is faid to have been built by Alexander the Great, and called Ifkander. Czar Peter became mafter of it during the civil wars of Perfia, and the emprefs Catherine II. took it in 1780. This city forms an oblong fquare on the declivity of an eminence, and is furrounded with a wall built of hewn ftone, five fathoms high, in many places 10 feet thick, and fortified with a number of round and fquare towers. On the higheft point lies the fort, which nature and art have contributed to render impregnable; but it lies too high to defend the city, and too remote to cover the harbour. Derbent is the refidence of a khan, and its inhabitants are chiefly Perfians, Tartars, and a few Armenians. Two or three Ruffian fhips are annually bound for Derbent; they are ufually laden with oats and rye, and carry iron, fteel, and lead for the Lefgues and other Tartar nations, who inhabit the eaftern chain of the Caucafus. The neighbourhood produces fome corn, but not fufficient for the confumption of the place. Shamakee, in the province of Schirvan, fupplies this port with falt, and filk, both raw and wrought for exportation; but Baku is a more convenient harbour. Derbent was anciently denominated the Cafpian or Albanian gates, as it occupies a fhort declivity between the mountains and the fea. The city, if we give credit to local tradition, had been founded by the Greeks; and this dangerous entrance was fortified by the kings of Perfia with a mole, double walls, and doors of iron. The adjoining territory of Derbent is very inconfiderabte in extent, being only four German miles in length on the fea-coaft, and extending from one and a half to two miles inland. The northern and fouthern boundaries are formed by the rivers Darbach and Rubas, between which lies a broad and partly marfhy level interfected by many fmall brooks, and here and there interfperfed with beautiful and well cultivated corn-fields. N. lat. 41° 52′. E. long. 54° 30′. The variation of the magnetic needle in June 16, 1796, was 11° 41′ 20″ E.

Derbent, a town of European Turkey, in the province of Romania, 20 miles N. of Adrianople.

Derbent, a town of Perfia, in the province of Chorafan; 110 miles N E. of Herat.—Alfo, a town of Perfia, in the province of Chorafan; 90 miles S. of Abiverd.

DERBICES, in *Ancient Geography*, a people of Afia, who occupied the banks of the Oxus, and who furnifhed Darius in his conteft againft Alexander with 2000 horfemen.—Alfo a people of Africa, in the interior of Libya.

DERBINSKOI, in *Geography*, a Tartarian village of Siberia, in the government of Irkutfk, on the Lena, N. lat. 60° 20′. E. long. 116° 14′.

DERBY, the county and principal town in Derbyfhire, England, occupies a flat tract of land on the banks of the river Derwent, the waters of which prove eminently ferviceable to the manufactures of this place. Derby was a place of repeated conflicts in the early periods of Englifh hiftory. In the year 874, it was occupied by the forces of Halfden, a Danifh chief, whofe head quarters were then at Rependune, now Repton. In 918, the Danes were ftill its mafters; but the fame year they were attacked by furprize, and completely routed by the heroic Ethelfleda, daughter of king Alfred, and princefs of the Mercians. In a few years the Danes regained poffeffion; but were again expelled in 942 by king Edmund, and about the fame time difpoffeffed of all the principal towns in the neighbouring counties of Lincoln, Stafford, Nottingham, and Leicefter. That Derby about this period was a place of great importance, is evident from its being mentioned in Domefday-book as a royal borough of Edward the Confeffor, containing fourteen mills for grinding corn, and 243 burgeffes, forty-one of whom held twenty-four plough-gates of taxed land. The annual rent then paid was 24*l*. When William the Conqueror obtained the crown, he gave Derby, with a great rent-roll, to his illegitimate fon, William Peverell. It was afterwards granted by Henry I. to the earl of Chefter, and made a corporate town; but its charter has been altered at various periods. It obtained additional privileges from Henry I. and II. Richard I. and John; in whofe time the burgeffes were indebted to the exchequer 56 marks, for the confirmation of their liberties. In the fame reign, they were likewife returned debtors in fixty marks, and two palfreys, for holding the town of Derby at the ufual fee-farm; and 10*l*. increafe for all fervices, and having fuch a charter as the burgeffes of Nottingham. A grant was obtained from Richard I., by which Jews were prohibited from refiding in the town. In the reign of Edward III. the corporation was deprived of its liberties, and fummoned into one of the king's courts, to anfwer "By what authority they demanded toll, yet paid none? Why they claimed the exclufive privilege of dyeing cloth, and prohibiting cloths to be dyed in every other place within ten leagues, except Nottingham? They were alfo to declare by what right they chofe a bailiff yearly; and why they kept a fair on Thurfday and Friday in Whitfun-week, and another of feventeen days at the time of the feftival of St James: to explain by what authority they had a coroner; why the burgeffes fhould not be fued out of their own borough; and wherefore they held weekly markets on Sunday, Monday, Wednefday, and Friday?" Some mutilated charters were produced in anfwer to thefe requifitions; but the liberties of the town were not reftored till the inhabitants had paid a fine of 40 marks, and confented to pay an increafe of rent. In the year 1611, James I. granted a new charter, confirming the privileges beftowed in former reigns, and invefting the corporation with

additional

additional liberties. By this charter the bailiffs, recorder, and town-clerk, or any three of them, were privileged to hold a court of record on every fecond Tuefday; to have the fole return of writs, keep a quarterly feffion, two courts-leet, and fix annual fairs; to be toll free throughout the kingdom; and receive toll from all, except the duchy of Lancafter, which was to pay only half the fums charged on the inhabitants of other places. In 1638, it was determined, that the authority of the two bailiffs fhould be vefted in one perfon, to be chofen annually, and to be called mayor. The then bailiffs, Henry Millor, and John Hope, were the firft that held that title. In 1680, the ancient charter was furrendered to Charles II., and a new one (the prefent) obtained at the expence of nearly 400*l.* The corporation now confifts of a mayor, nine aldermen, fourteen brethren, (out of whom the aldermen are elected) fourteen common-council men, a recorder, a high-fteward, and a town-clerk. The privilege of returning members to parliament is poffeffed by the freemen and fworn burgeffes; about 700 in number. In the reign of queen Mary, a woman was burnt in this town for maintaining that the facrament was only a memorial or reprefentation of the body and blood of Chrift, and that the elements were merely bread and wine. In 1592, the plague ravaged this town: and in 1665, when London was nearly depopulated by that dreadful calamity, it again broke out at Derby, and proved fo fatal, that the country people refufed to bring their commodities to the market-place. The inhabitants, to prevent a famine, raifed a pile of ftones, which received the name of Headlefs-Crofs, in an open fpace without the town. Here the market people placed their provifions, and retired, till the buyer, who was not permitted to touch any article, till purchafed, had concluded his bargain, and depofited his money in a veffel filled with vinegar. In the rebellion of 1745, Derby was diftinguifhed as the fartheft place in England to which the pretender's army reached. Their coming being expected, proper meafures had been taken for the fafety of the town; and nearly 600 men raifed by fubfcription, befides 150 levied and maintained at the fole expence of the duke of Devonfhire.

The fituation of Derby, on the banks of the Derwent, renders it, as before obferved, extremely favourable for the inftitution, and procefs, of manufactures which require the aid of water; and various works have been eftablifhed in the town, or its immediate vicinity. Their fuccefs, however, has been greatly promoted by the judicious application of machinery; and mills on the moft improved conftruction have been erected for various purpofes. Thofe belonging to Meffrs. Strutts, for the manufacture of cotton, are particularly ingenious; and the facility attained by them in working ftockings, figured waiftcoat-pieces, and many other articles, has eminently contributed to the extenfion of this branch of bufinefs. One of thefe mills is remarkable for its floors being all conftructed on brick arches, and paved with brick, whereby it is rendered abfolutely indeftructible by fire. This building is fix ftories high, 115 feet long, and 30 feet wide; it was erected in 1793, and was the firft fire-proof mill ever built.

Befides the cotton factories, the manufactures moft celebrated in Derby, are thofe of filk, porcelain, and ornaments, &c. of Derbyfhire fpar and marble. The manufacture of filk is carried on to a great extent, and the number of men, women, and children employed in it is upwards of 1000. The work is chiefly performed by means of machines, or mills, of various fize, and different conftruction. The original mill, called the filk-mill, by way of pre-eminence, being the firft and largeft of its kind ever erected in England, ftands on an ifland on the river Derwent. Its hiftory is remarkable, as it exemplifies the power of genius, and the vaft influence which the enterprifes of an individual has on the commerce of a country.

The extenfive fabric which contains the machinery, ftands upon huge piles of oak, doubly planked, and covered with ftone-work, on which are turned thirteen ftone arches, that fuftain the walls. Its whole length is 110 feet, its breadth 39, and its height 55½. It contains five ftories, befide the under works, and is lighted by 468 windows. In the three upper ftories, are the Italian winding engines, which are placed regularly acrofs the apartments, and furnifhed with many thoufand fwifts and fpindles, and engines for working them. In the two lower rooms are the fpinning and twift mills, which are all of a circular form, and are turned by upright fhafts paffing through their centres, and communicating with fhafts from the water-wheel. Their diameter is between twelve and thirteen feet, and their height nineteen feet eight inches. The fpinning mills are eight in number, and give motion to upwards of 25,000 reel bobbins, and nearly 3000 ftar-wheels belonging to the reels. Each of the four twift mills contains four rounds of fpindles, 389 of which are connected with each mill, as well as numerous reels, bobbins, ftar-wheels, &c. The whole of this elaborate machine, for *one* only it is, though diftributed through five large apartments, is put in motion by a fingle water-wheel, twenty-three feet in diameter, fituated on the weft fide of the building. The whole number of wheels is about 14,000. All the operations are performed here, from winding the raw filk, to organizing or preparing it for the weavers. The raw-filk is chiefly brought in fkains or hanks from China and Piedmont; that produced in the former country is perfectly white, but the produce of the latter is of a light yellow. The fkain is firft placed on an hexagonal wheel, or *fwift*, and the filaments which compofe it are regularly wound off upon a fmall cylindrical block of wood, or *bobbin.* To wind a fingle fkain is the work of five or fix days, though the machine is kept in motion ten hours daily; fo aftonifhingly fine are the filaments of which it is formed. In this part of the procefs, many children are employed, whofe nimble fingers are kept in continual exercife by tying the threads that break, and removing the burs and uneven part, fome of which are the cafes which the filk-worm fabricates for its own grave, or rather for its dormitory, while nature prepares it for a new mode of exiftence. The filk thus wound upon the bobbins, is afterwards twifted by other parts of the machinery, and is then fent to the *doublers*, who are chiefly women, ftationed in a detached building, which ftands on the fame ifland, on piles like the filk-mill; and though not half fo broad, is nearly thirty feet longer. Here four, feven, or ten of the threads are united into one, according to the ufes for which they are defigned; the fine kind going to the ftocking weaver; the others to the manufacturers of waiftcoat-pieces, &c.

The manufacture of porcelain was originally eftablifhed at Derby about the year 1750, by the late ingenious Mr. Duefbury; but the moft confiderable improvements have been effected fince his deceafe, through the judicious methods employed in preparing the pafte, and increafing the beauty of the decorations. The ware itfelf is not of equal finenefs with the French and Saxon; though its workmanfhip and ornaments are far fuperior. The paintings are, in general, rich and well executed, and the gilding and burnifhing exceedingly beautiful. The body of the femi-vitreous ware, called porcelain, is fine white clay, combined with different proportions of fluxing matter. The beft kind is abfolutely infufible, and takes for its glaze a vitreous fubftance,

ftance, without a particle of lead. When the pafte is duly prepared, by grinding and other operations, it is configned to the workman, whofe dexterity produces a variety of beautiful forms from the fhapelefs mafs delivered to him. Round veffels are ufually made by a man called a *thrower*, who works them on a circular block, which moves horizontally on a vertical fpindle. From him they pafs to the lathe, and are reduced to their proper thicknefs and form at the end of an horizontal fpindle. Afterwards they are *finifhed*, and *handled* if neceffary by other perfons, and are then conveyed to a ftove where they remain till the moifture is entirely evaporated, when they become fit for baking. Oval veffels, fuch as tureens, tea-pots, &c. affume their form by being *preffed* into moulds of plafter, or gypfum, by hand. The *faggars*, or cafes, in which the articles are burnt, are various in fize and dimenfions. Thefe are fet in the kiln or oven, one upon the other, and when piled up nearly to the top, have fome appearance of piles of cheefe. When the kiln is full, it is carefully clofed, and the ware baked by the admiffion of heat through horizontal and vertical flues; this is the firft baking, and the porcelain in this ftate is vulgarly called bifcuit. It is then dipped in glaze of about the confiftence of cream, and carried to the glaze kiln, where it is again baked, but in a lefs degree of heat than before. The ware is now delivered to the painters, who, with colour prepared from mineral bodies, ornament it with landfcapes or figures, according to the required patterns. After this procefs, it is again conveyed to the kiln, and the colours vitrified, in order to fix and give them a proper degree of luftre. Every coat, or layer of colour, requires a frefh burning; once or twice is fufficient for the ornaments of the common porcelain, but the more elaborate decorations render it neceffary for the colours to be laid on, and undergo the action of fire feveral times, before they obtain their full effect. This completes the procefs of thofe articles that have no gold in their pattern; but where this addition is wanted, they are pencilled with a mixture of oil and gold diffolved, or thrown down by quickfilver aided by heat, and once more committed to the kiln; here the gold reaffumes folidity, but comes out with a dull furface, which is quickly rendered brilliant by rubbing with blood ftones, and other polifhing fubftances. The porcelain is now ready for ufe, but the latter part of the procefs requires confiderable care, as the gold, when not fufficiently burnt, will feparate in thin flakes, and when over-fired, will not receive a proper polifh. The higheft finifhed ware in this manufactory is frequently returned to the enamel kiln, where the colours are fluxed fix or feven times; the beft only are here finifhed for fale. The making of bifcuit figures, or white ware, is peculiar to this manufactory; and the pieces are fuppofed to be equal in beauty and delicacy to any of a fimilar kind made in Europe. Here the lathe is of no ufe, the figures being all caft in moulds of plafter or gypfum, into which the materials are poured, having previoufly been reduced to a liquid of the confiftence and appearance of thick cream. The water contained in the mixture is quickly abforbed by the plafter, and the pafte becomes fufficiently hard and tenacious to part freely from the mould. The various parts of the figures, as the head, arms, legs, &c. are caft in feparate moulds, and when dried and repaired, are joined by a pafte of the fame kind, but thinner than the former. The articles are then fent to the kiln, and after undergoing a regular and continued heat, come out extremely white and delicate.

The original filk-mill, erected by Mr. Crochet, and now called the old fhop, was afterwards converted into a cotton factory, but is at prefent in the occupation of Meffrs. Brown and fon, who employ it for cutting and polifhing marble, and manufacturing the Derbyfhire fluor fpar, or blue John, and gypfum, into a variety of beautiful ornaments, as urns, vafes, columns, obelifks, &c. The machinery applied to execute thefe purpofes is of very ingenious conftruction; and the lathes are fo contrived, by the affiftance of a reverfe motion, that they can readily be made to revolve either flower or fafter, as the defign or quality of the fubftance under manufacture may require. They may likewife be ftopped at pleafure, without impeding the motion of any other part of the works. When the blue John is to be made into a vafe, or any other ornamental form that renders the ufe of the lathe neceffary, it is carved with a mallet and chiffel, into a rude refemblance of the object intended to be produced, and being afterwards ftrongly cemented to a plug or chock, is fcrewed upon the lathe. A flow motion is then given to the work, and a bar of fteel about two feet long, and half an inch fquare, properly tempered, and pointed at each end, is applied to the fluor, on which water is continually dropping to keep the tool cold, preferve it from friction, and enable it more readily to reduce the fubftance upon which it acts. As the furface becomes fmoother, the tool is applied with more freedom, and the motion of the lathe accelerated, till the fluor has affumed its deftined form. When the turning is completed, pieces of grit-ftone, of different degrees of finenefs, are applied with water to bring the article to a proper ground for polifhing with fine emery, tripoli, and putty, or calx of tin. Thefe means are continued till the fluor is incapable of receiving a higher degree of polifh; which is known when water thrown on it will no longer increafe its luftre. The advantage of the lathe fet in motion by water over thofe worked by the foot, is faid to be particularly confpicuous in forming hollow vafes, or articles of equal delicacy. By the ufe of the foot-lathe the fluor was frequently broken, and without extreme care, its laminated texture always difturbed; but the greater fteadinefs given to the machinery by the water-wheel, operates as an effectual prefervation from thefe inconveniences. The great eafe with which a flow or quick motion can be produced by the ufe of the water lathe, is alfo an additional advantage, and tends confiderably to increafe the elegance of the ornaments. The fame wheel which gives motion to the lathes for manufacturing the fluor-fpar, &c. is likewife applied to work the machinery for fawing and polifhing marble. On the vibrating poles to which the cranks are fixed are fliding boxes, containing fets of faws, which are nothing more than thin plates of foft iron, that drop as they cut the marble. Thefe are fupplied with fand and water; and being moveable with fcrews, may be arranged at different diftances, fo that the flabs may be cut of any thicknefs. A fet of faws confifts of a different number of plates, fo that the block to which they are applied may be feparated at one procefs into as many flabs as may be thought neceffary. The flabs thus fawn, are taken to the polifhing bed, which has four wheels that move on a gangway with a very flow motion given to it by a worm and a crank. One of the flabs being fixed on this bed, another is faftened above it to an arm attached to a vibrating pole, that works with a quick motion in a tranfverfe direction. The flabs thus moving in contact with each other, and being fupplied with fand and water, foon acquire a level furface, when finer materials are employed to increafe their fmoothnefs, and give them a higher polifh.

Derby is divided into five parifhes, each of which has a church. The principal ornament of the town is All-Saints church: yet, refpectable as it is, it difplays a remarkable inftance of architectural incongruity. The tower was erected

erected in the reign of Henry VIII., and its upper part is richly ornamented with tracery, crockets, high pinnacles, and battlements; but the body is Grecian, and the interior is particularly light and fpacious. The roof is fupported by five columns on each fide. The defign of the body of the church was executed by Gibbs, the ingenious architect of St. Martin's in the Fields, London. The money for building it was chiefly procured through the indefatigable exertions of the then minifter, Dr. Michael Hutchinfon, whofe zeal and fuccefs in this work are recorded on a tablet to his memory, placed againft the fouth wall within the church. On the fouth fide of the chancel is the monument room of the Cavendifhes; and many of that illuftrious family are buried in the vault beneath. In this repofitory is a fplendid mural monument to the memory of the celebrated countefs of Shrewfbury; it was conftructed in her life-time, and under her infpection. Among other monuments deferving of notice, is one to the memory of William, earl of Devonfhire, who died in 1628, and Chriftian, his countefs. Another neat monument, by Nollekins, difplays the medallion and arms of William, earl of Befborough, who died in 1793: and on a mural monument, by Ryfbrach, to the memory of Caroline, countefs of Befborough, who died in 1760, is a well executed figure of that lady. Againft the wall, on the north fide of the church, is a curious memorial of Richard Crofhaw, who was the fon of a poor nailor in this town, and went to London in a leathern doublet to feek his fortune: poffeffing induftry and perfeverance, his endeavours proved fuccefsful; and having attained confiderable affluence, he bequeathed upwards of 4000*l*. to the corporation of Derby, for the maintenance of lecturers, the relief of the poor, and other benevolent purpofes. He died in 1631. The other four churches of this town are refpectively dedicated to St. Alkmund, St. Peter, St. Werburgh, and St. Michael. The firft of thefe is fuppofed to have been founded at the beginning of the ninth century, in honour of Alkmund (fon of Alured, the depofed king of Northumberland) who was flain in battle while endeavouring to reinftate his father.

The principal public buildings in Derby are a county hall, a town hall, a county gaol, an elegant affembly room, and a theatre. The county hall, which is a large but heavy building of free-ftone, was finifhed in the year 1660. The town hall, built by the corporation in 1730, is a handfome ftructure. The county gaol was erected about 1756, at the expence of the county, aided by a donation of 400*l*. from the duke of Devonfhire: it is fituated on the eaft fide of the town, near the upper end of Friar gate, and is a very refpectable building, well adapted for the purpofe of its deftination: the front is from an excellent defign, difplaying folidity and ftrength, without that affectation of incongruous ornament fo frequently exhibited in modern buildings of fimilar character. The affembly room is of ftone, and is fituated on the north-eaft fide of the market place: the foundation was laid in 1763; but the edifice was not completed till 1774. The theatre ftands in Bold lane, is built of brick, and was erected in 1773.

Derby is a very improving and populous place; and though the buildings have been continually increafing for the laft twenty years, they are yet infufficient for the convenience of the inhabitants. Frefh ground is frequently broken up for new houfes, which are moftly let before they are completed: the number of houfes, as afcertained by the late act, was 2,144, that of the inhabitants 10,832; but both are increafing, and there is reafon to believe, will keep pace with the progreffive improvements of the town, and the augmentation of its trade. Various branches of bufinefs, befides the manufactures already mentioned, are carried on to a confiderable extent, and feveral new works of magnitude have lately been eftablifhed. On Nun's green a bleaching-ground has been opened, in which the proceffes are performed according to the improved methods introduced by the advancement of chemiftry: to aid the operation, a fmall fteam-engine has been erected. A mill for flitting and rolling iron for a variety of purpofes; a large furnace for fmelting copper ore, with a machine for battering and rolling the copper into fheets; a red lead manufactory; a mill for making tinned-plates, &c. are alfo exifting in this town or its immediate vicinity. Among the modern improvements of Derby, may be included the lighting and paving of the ftreets, and the removing of thofe obftructions that prevented a free paffage. Thefe purpofes were effected by an act paffed in 1792, which appointed commiffioners with full power to levy a fmall rate on the inhabitants, and likewife to fell all the common land belonging to Nun's green; the fums thus produced to be applied in defraying the neceffary charges. Since the above year, feveral of the bridges that were built acrofs the Markeaton Brook have been removed, and three new ones, of ftone, erected by fubfcription. An elegant bridge of three arches has likewife been built over the Derwent; and, together with the filk-mill, the weirs, and the broad expanfe of the river, forms a very pleafing profpect on entering the town from the Nottingham road.

Numerous bequefts for the relief of the poor have been made at different times by benevolent perfons. One of the moft confiderable charities is the Devonfhire alms-houfe, founded by the countefs of Shrewfbury in queen Elizabeth's reign, for the fupport of eight men and four women: the old houfe was taken down about twenty years ago, and the prefent erected by the duke of Devonfhire. Science and literature meet with great encouragement at Derby: this may, in fome degree, be afcribed to the Philofophical Society eftablifhed here about the year 1772, through the foftering patronage of the late Richard French, efq. and Dr. Darwin, the latter of whom for many years made this town his refidence. Several book-focieties have alfo been inftituted; and to the credit of the individuals compofing them, the works purchafed are chiefly of a fcientific and philofophical tendency.

Derby, previous to the diffolution of religious houfes, contained a monaftery dedicated to St. Helen, founded by Robert de Ferrariis, fecond earl of Derby, about the middle of the twelfth century; a fmall Benedictine nunnery, founded foon after the former by an abbot of Derby, and dedicated to St. Mary de Pratis; a priory of Dominicans, or Black Friars, founded towards the clofe of the thirteenth century; and a cell of Cluniac monks, founded by Waltheof, a Saxon nobleman, dedicated to St. James, and given early in the twelfth century to the abbey of Bermondfey, in Southwark. Here were alfo an hofpital dedicated to St. Leonard, and a maifon-dieu, both inftituted for the reception of lepers.

Derby is fituated 126 miles N.W. from London; it has a weekly market on Friday, and feven annual fairs.

The celebrated aftronomer John Flamftead, is confidered by fome authors as a native of this town; an opinion which, though controverted, is favoured by the circumftance of his father refiding here.

The vicinity of Derby furnifhes a variety of agreeable walks, where the inhabitants may enjoy a falutary exercife, and a fucceffion of profpects diftinguifhed by the fofter features that attend cultivation. On Windmill-hill, at a fhort diftance from the town, a neat profpect-houfe has lately been erected by —— Robinfon, efq. from which the views over the adjacent country are very extenfive. Hutton's Hiftory

of

of Derby, 8vo. Pilkington's Hiftory of Derbyfhire, 2 vols. 8vo. Beauties of England and Wales, vol. iv.

DERBY, a townfhip of America, in Orleans county, Vermont, on the N. line of the ftate, on the E. fhore of lake Memphremagog.—Alfo, a poft-town in New Haven county, Connecticut, on the point of land formed by the confluence of Naugatuck and Houfatonick rivers. This town was fettled in 1665, and is now divided into two parifhes, and has an academy. It has a confiderable trade with the Weft Indies, and in its vicinity are mills on the falls of Naugatuck, and iron as well as other works on Eight-mile river, that falls into the Houfatonick, which is navigable for 12 miles to this town. It has 1878 inhabitants.

DERBY, or DARBY, *Upper* and *Lower*, are fituated in Delaware county, Pennfylvania; the former containing 862, the latter 980 inhabitants; feven miles S.W. of Philadelphia.

DERBY-*neck*. See BRONCHOCELE.

DERBY *Canal* is the parliamentary name of a navigable canal in the county of Derby, which was completed in the year 1794, between the Trent river at Swarkftone, and Little Eaton, with a rail-way extenfion thence to the collieries at Smithey-Houfes, near Denby, and a branch from the fame to Horfley and Smalley Mills collieries. There is alfo a branch from the town of Derby to the Erewafh canal, near Sandyacre. See CANAL.

DERBYSHIRE is a county fituated nearly in the middle of England, at an equal diftance from the eaftern and weftern feas. It is encompaffed by Yorkfhire and Chefhire to the north, and Staffordfhire, Leicefterfhire, and Nottinghamfhire to the eaft, weft, and fouth. The area is fuppofed to meafure about 55 miles from north to fouth, and 38 in an oppofite direction, and comprifes nearly 720,640 acres of land. Of thefe above 500,000 are cultivated arable and pafture, whilft the remainder confifts chiefly of bleak mountainous regions, and open commons. The whole county is divided into fix hundreds, and contains 11 market towns, and 136 parifhes. Thefe comprehend 33,191 houfes, and about 161,142 inhabitants.

The northern and fouthern parts of this county exhibit a ftriking difference and contraft in geographical features: as the former abounds with hill and vale, and the latter prefents a flat-furface. The higher region isdenominated the High Peak, and the latter the wapentake, or Low Peak. Among the chief eminences in this diftrict are the mountains of Ax-edge, and Kinder-fcont. The former is fituated near Buxton, and was calculated by Mr. Whitehurft to be about 2100 feet higher than the town of Derby, and 1000 feet above the valley in which Buxton-hall ftands: the elevation of Kinder-fcont, though not precifely afcertained, is fuppofed to be greater. The High Peak is a region of bleak barren heights, and long extended moors, interfperfed with deep vallies, through which the fmall ftreams take their courfe. Here the fcenery is in many parts romantic and fublime; though, on the whole, inferior in picturefque effect to that of other mountainous countries. Beauty, indeed, is only refident in the vallies; the high ground appearing dreary and deftitute of entertainment; and in many fituations not a fingle houfe or tree is to be feen, to divert the eye of the traveller, or relieve the wearinefs that arifes from the contemplation of fterility and nakednefs. The Low Peak abounds with eminences of various height and extent. Braffington-Moor, Alport, near Wirkfworth, and Crich-Cliff, are the moft elevated, and command very extenfive profpects: from Alport, on a clear day, the Wrekin in Shropfhire may be diftinguifhed. On the eaft fide of the county there is alfo a high ridge of confiderable extent, beginning to the fouth of Hardwick, and continuing in another direction to the extremity of the county, where it enters Yorkfhire. The fouthern part of Derbyfhire is in general pleafant and well cultivated, but prefents no particular variety of fcenery. The mountainous part of this county is diftinguifhed from the reft, by the greater quantity of rain which falls in it. At Chatfworth, which is by no means the higheft tract, about 33 inches of rain have been found to fall annually at a medium. The High Peak is peculiarly liable to violent ftorms, in which the rain defcends in torrents, fo as frequently to occafion great ravages in the lands; it is alfo fubject to very high winds. Thefe caufes, together with the elevation of the country, render it cold, fo that vegetation is backward and unkindly. Some kinds of grain will not grow in the Peak, and others feldom ripen till very late in the year. The atmofphere is, however, pure and healthful, and the higher fituations are generally free from epidemic difeafes, though agues and fevers fometimes prevail in the vallies. One difeafe is, however, endemic in thefe parts, and even as far fouth as Derby; this is the Bronchocele or Derby-neck: it is an enlargement of the glands of the throat; and is a degree of the fame difeafe that is known in the Alps, and other mountainous tracts. It is alfo prevalent in fome parts of Sumatra and the Eaft Indies.

The moft common foil of Derbyfhire is a reddifh clay, or marl; the fouthern diftrict is in general compofed of it, having little or no ftone near the furface: but fome parts of this tract are interfperfed with fmall beds of fand or gravel; and in moift fituations, land of a blackifh colour, and loofe texture, is fometimes met with, continuing through an extent of from 50 to 200 acres. This kind of foil is likewife found throughout the fouthern and middle part of the extenfive tract of limeftone, which lies on the north-weft fide of the county. Its colouring principle is iron; but its quality is very various in different fituations: in fome it contains much calcareous earth; in others it does not effervefce with acids. The large tract on the eaftern fide of the county, which extends from Stanton, Dale, and Morley, to the borders of Yorkfhire, and abounds with coal, is covered with a clay of various colours, black, grey, brown, and yellow, but principally the laft; and is in fome places mixed with a large proportion of fand. Similar foil is alfo met with in the northern extremity of the county; and in fome parts where gritftone is found; but in the latter fituations, the land is more frequently of a black colour, and bituminous quality. In the vallies, near the banks of the larger rivers, the foil is very different from that of the adjacent parts, and has been evidently altered by the depofitions from the inundations. Peat bogs exift in the north parts of the county, even on the higheft mountains; and in fome of them, trees have been found nearly perfect. Barley is much cultivated in many parts, but particularly in the parifhes of Grefley and Repton, where the farmers are induced to grow it, by the confumption of malt in the neighbouring town of Burton, whofe famous ale has acquired fuch extenfive celebrity. The whole produce has been calculated at about 5000 quarters annually. On the eaftern fide of the county the land is chiefly under tillage; but the midland tracts have a mixture of pafture and arable, according to fituation: the moors in this diftrict are in a courfe of progreffive improvement. In the High Peak the grounds are chiefly appropriated to the grazing and breeding of cattle; very little corn, befides black oats, being grown: on the more elevated parts, fheep of the fmaller horned kind are fed: the mutton is excellent. Little attention has been paid to the cultivation of artificial graffes: but an uncommon fpecies of culture, as a field crop, here practifed is that of chamomile: about 200 acres are devoted to its growth,

growth. A loamy ſoil is choſen for its cultivation, and, after the ground is well prepared by thorough cleanings, about the end of March, the roots of an old plantation are taken up, and divided into ſmall ſlips, which are planted in rows about eighteen inches aſunder, and at about the ſame diſtance in the rows. The plants are kept clean by frequent hoeing and weeding with the hand. In September the flowers are fit to gather: their perfection depends upon their being fully blown, without their having ſtood ſo long as to loſe their whiteneſs; the flowering continues till ſtopped by the froſts. The gatherings are repeated as often as ſucceſſions of flowers appear; but this depends very much on the ſeaſon, dry open weather furniſhing more ſucceſſions than wet or dull weather. When the flowers are gathered, they are carefully dried, either in kilns very moderately heated, or on the floors of boarded rooms, heated by ſlow fires: the object is to keep the flowers white and whole, and this is beſt effected by drying them as ſlowly as poſſible. The produce varies from two hundred weight, or even leſs, to four, five, and in ſome few inſtances, ſix hundred weight *per* acre. The price has alſo varied from 2*l.* to 7*l.* *per* cwt. The plants uſually ſtand three years, of which the firſt affords the ſmalleſt produce; and the ſecond the greateſt and beſt. When the ſame plants are continued beyond three years, the ground becomes foul, and the flowers weak. When dried, the flowers are packed in bags; and afterwards ſold to perſons in the neighbourhood, who tranſmit them to the druggiſts in London.

For the botanical character and medicinal properties of chamomile, ſee Anthemis.

The incloſures of Derbyſhire are very numerous, and are annually extending. Within the laſt twenty or twenty-five years, more than one-fourth of the county has been incloſed, and the rent in many inſtances nearly doubled. The ſouthern part, and the wapentake, are almoſt wholly in this ſtate; but the grounds in the High Peak are chiefly open. The former diſtricts are tolerably well provided with timber, but in this reſpect the plantations of Kidleſton park are unrivalled by any in the county.

The manufactures which are carried on in Derbyſhire are various and extenſive. With Nottinghamſhire and Leiceſterſhire, it partakes in the manufacture of ſtockings; with Yorkſhire, in that of iron, and of woollen-cloth; and with Lancaſhire, in that of cotton. To theſe may be added the manufactures of ſilk and of Derbyſhire ſpar, the latter of which may be conſidered as peculiar to this county. The buſineſs of hoſiery is chiefly confined to the parts that border on Nottinghamſhire, and to Litton, near Tideſwell. The number of frames employed, including thoſe on which ſilk and cotton ſtockings are wrought, has been calculated at about 1350. Wool is moſtly manufactured in the High Peak, adjacent to Yorkſhire. Cotton is manufactured in different modes, and in various parts of the county; but the principal factories are at Cromford, Belpar, and Derby: in the former the cotton is prepared by the machine invented by the late ſir Richard Arkwright; from ſixteen to twenty machines, on the ſame model, are alſo employed in other parts of the county. The ſilk and ſpar manufactures are nearly confined to the town of Derby.

Beſides the ſources of labour derived from the branches of commerce above enumerated, the mines of lead, iron, calamine, and coal, afford employment to many inhabitants of this county. The lead mines conſtitute a conſiderable part of the natural riches of Derbyſhire, and ſome of them have probably been worked through a long ſucceſſion of ages: their produce was formerly of greater value than at preſent; as the veins become poorer, the deeper the mines are excavated. Camden imagined that Derbyſhire was alluded to by Pliny, where he ſays, "In Britain lead is found near the ſurface of the earth in ſuch abundance, that a law is made to limit the quantity that ſhall be gotten." However this may be, we have deciſive evidence that the Romans had lead works in this county, as ſeveral pigs of lead have been found with Roman inſcriptions. The firſt of theſe was diſcovered on Cromford Moor, in the year 1777, on which the following ſentence was legible: IMP. CAES. HADRIANI. AVG. MEI. LVI. That the lead mines of Derbyſhire were known to the Saxons, is apparent from the mine near Caſtleton, called *Odin*, from the name of one of their deities: the ſame circumſtance implies that it was opened previous to the introduction of Chriſtianity into Britain. It appears alſo, that there were lead mines in the wapentake of Wirkſworth, in the year 835; for at that period Kenewara, abbeſs of Repton, granted her eſtate at Wirceſworth to Humbert the alderman, on condition that he annually gave lead of the value of 300 ſhillings to archbiſhop Ceolnoth, for the uſe of Chriſt-Church Canterbury. At the time of the Norman ſurvey, the buſineſs of the lead mines was undoubtedly carried on to a conſiderable extent, as no leſs than ſeven mines in this county are mentioned in the Domeſday book.

Veins of lead ore are diſtinguiſhed on account of their various poſitions in the earth, by the different names of pipe, rake, and flat works. Pipe-works lie between two rocks or ſtrata, yet ſeldom follow any regular inclination, but fill up fiſſures, the lines or branches running parallel to each other, and more or leſs horizontally. The veins are ſometimes twenty or thirty yards wide, and ſometimes not more than two inches: they moſt commonly have toad-ſtone in the vicinity, either above or below. Rake, or perpendicular veins, are found in the clefts and chaſms of the lime-ſtone; and conſequently, inſtead of extending uniformly between the ſame ſtrata, they follow the directions of the cavities, and ſometimes penetrate 150 or 200 yards into the earth. The flat-works bear a great reſemblance to the pipe; yet diſagree in ſome circumſtances. The principal leader or ſtem in the pipe is accompanied with many branches, but the flat has none; the latter ſpreads wider, yet ſeldom extends more than 100 yards. It is alſo found near the ſurface, and in the ſolid rock. The miners are divided in opinion whether the pipe or rake veins are moſt prevalent.

The greateſt impediments to working the mines are foul air, and water. To relieve them from the firſt, a pipe or tube is generally introduced down the ſhaft, and extended along the roof of the gallery, to the place where the work is carried on. To remove the water many adits, or, as they are here termed, ſoughs, have been driven from the bottom of ſome neighbouring valley, and made to communicate with various works by different channels or galleries. The longeſt adit in Derbyſhire is at Youlgrave, running from the Derwent to Alport, and called the Hilcar ſough. This coſt upwards of 50,000*l.* It relieves a conſiderable number of mines, and is nearly four miles in length. Another, and one of the moſt conſiderable at Wirkſworth, is called Cromford ſough. This is full two miles in length, and was driven at an expence of 30,000*l.*

The annual produce of lead from the Derbyſhire mines cannot be exactly aſcertained, but may be eſtimated at an average of between 5000 and 6000 tons. The trade has been generally conſidered to be on the decline, as the increaſe of depth renders the mines more difficult to be worked, as well as more expenſive; yet, from the improvements that have been made in the art of ſmelting, and the more effectual mode employed to relieve the mines from water, by the driving of new

new levels, and the erection of some improved fire-engines, advantages have been obtained, which, to a certain extent, counterbalance the augmented expences.

Iron-ftone, or oxyd of iron, is found in this county in great abundance; it occurs throughout the whole diftrict in which coal has been difcovered, the Chinley hills excepted. The depth at which it lies from the furface is various, but frequently, from the great dipping of the ftrata, it *baffets* out *to-day*, as they here term it. In this cafe a hole is made like the fhaft of a coal pit, which is gradually enlarged as it is carried deeper, till the cavity affumes the fhape of a bell. Thefe are feldom funk lower than eighteen or twenty yards; when at that depth frefh ground is broken, and new openings made, of fimilar depth and form. From this practice the land receives greater injury by working iron mines, than thofe of coal; and it is, therefore, not judged expedient to dig for iron ore, unlefs the beds are very rich. Their thicknefs varies from two to twelve inches. The quantity of iron annually produced in this county amounts to between fifteen and fixteen thoufand tons. See Iron.

The chief places at which calamine is obtained, are Caftleton, Cromford, Bonfall, and Wirkfworth. It occurs at various depths, but is generally found near a vein of lead ore: fometimes the two minerals are mixed, or run a confiderable way by the fide of each other; but more frequently, one ceafes where the other begins, and a good vein of both is never found in the fame place. The quantity prepared annually in this county is about 500 tons. In the crude ftate, its value is from three to four pounds a ton; but when refined, it is fold at nine or ten pounds. By the various proceffes it undergoes before it becomes faleable, it lofes about eight parts in twenty. See Calamine.

Coal was obtained in Derbyfhire fo early as the reign of Edward II., both in the liberties of Norton and Alfreton. This is evinced by the grant made to the monks of Beauchief abbey by the lord of Alfreton, Thomas de Chaworth, who gave them licence to fupply themfelves with this fubftance in any quantity they thought proper, from either of the above places. It is found at different depths, and in fome fituations feveral beds are perforated by one fhaft; but the upper ones are of inferior quality, and feldom worked. Here, as in Cumberland, the vein of coal is frequently feparated, or broken, by fome intervening fubftance, moftly clay; and the coal on one fide is fometimes found lifted up or caft down ten or twenty yards from its level, on the other. Befides the home confumption of coal, which is very great, large quantities are annually fent to Sheffield; and by the different canals more is conveyed into Leicefterfhire, Nottinghamfhire, Lincolnfhire, and Northamptonfhire.

Derbyfhire alfo abounds with metallic ores, foffils, and various mineral fubftances; but it would exceed our limits to particularize all. Thofe who wifh for fuch information are referred to Mawe's Mineralogy of Derbyfhire, and the Beauties of England and Wales, vol. iii.

The mineral and medicinal waters of Derbyfhire are, as might be expected in a country abounding with foffils, numerous. All thofe of a chalybeate and fulphureous nature arife in beds of fhale, and probably derive their impregnation from this fubftance; the warm fprings alfo are obferved to appear near thefe beds, though they break out in the ftratum of lime-ftone almoft exclufively. The moft celebrated warm fprings are thofe at Matlock and Buxton; they occur likewife at Stony Middleton; and Middleton, near Wirkfworth, had formerly a fpring of this defcription, which was cut off fome years fince by driving a fough to remove the water from fome lead mines in the vicinity. Thofe of Matlock and Buxton have obtained much celebrity for their medicinal properties, and are annually vifited by a confiderable afflux of company, who refort to them as well for pleafure as for health. The natural hiftory of the Matlock and Buxton waters occupied much of the attention of the late Dr. Darwin, whofe death has deprived fociety of one of its moft valuable members, and fcience of one of her moft diftinguifhed fons. His principal obfervations on this fubject were contained in a letter written to the Rev. Mr. Pilkington, and publifhed in the "View of Derbyfhire." Among the arguments which have been adduced refpecting the origin of warm fprings, the doctor favours the following: "That the water of thefe fprings is raifed in vapour by fubterraneous fires deep in the earth, and that this vapour is condenfed under the furface of the mountains in the vicinity of fprings."

Amongft the fulphureous waters of Derbyfhire, that which is higheft in repute rifes in the park of lord Scarfdale, at Kidlefton. In a glafs it looks very clear and tranfparent; but in the well it appears of a blackifh blue colour, tinged with purple, and any fubftance thrown into it affumes the fame appearance. It is principally valued for its antifcorbutic qualities. When taken inwardly it acts as a diuretic, and has given relief to perfons afflicted with the gravel. It has alfo been found efficacious, from external application, in various cutaneous difeafes, but more efpecially in ulcerous complaints. The temperature of the fpring is about forty-feven degrees. Several other fulphureous fprings rife in different parts of the county, but have hitherto undergone very little examination.

The chalybeate waters are numerous, but the moft celebrated fpring of this nature is at Quarndon, about three miles from Derby. Perfons of a weak and relaxed habit have been much benefited by its ufe: when taken in fufficient quantity, it generally operates as a cathartic; yet to produce this effect, exercife is fometimes neceffary. Its temperature is nearly forty-nine and an half. Within 200 yards of the warm fpring at Buxton, there is a chalybeate water of properties nearly fimilar to that at Quarndon. Other chalybeate waters are found at Morley, Chefterfield, Tibfhelf, Duffield, and Bradley.

In the liberty of Heage, about midway between Crich and Belpar, is a martial vitriolic fpring, the only one that has yet been found in this county. It is fituated in a black boggy foil, and was accidentally difcovered about thirty-fix years ago.

The principal rivers of this county are the Trent, the Derwent, the Dove, the Wye, the Errewafh, and the Rother.

Derbyfhire is fituated in the diocefe of Lichfield and Coventry, and fends four members to parliament, *viz.* two for the county, and two for the county-town. Pilkington's View of Derbyfhire, 2 vols. 8vo. Mawe's Mineralogy of Derbyfhire, 2 vols. 8vo. Beauties of England and Wales, vol. iii.

Derbyshire *Spar*. See Fluor-Spar.

DERCETO, or Atergatis, in *Mythology*, a Syrian goddefs, fuppofed, by many learned perfons, to be the fame with *Aftarte*. See Astarte, and Atergatis.

DERDER, in the *Materia Medica of the Ancients*, a name ufed by Avicenna and Serapion, to exprefs the common elm, whofe bark they ufed on many occafions.

DERE, or Dire, in *Ancient Geography*, a maritime town of Ethiopia, fituated on a promontory of the fame name, at the entrance of the Arabic gulf, now cape *Bab-el-Mandeb*.

DEREA, a town of the Peloponnefus, in Arcadia. Steph. Byz.

DEREFELD, in our *Old Writers*, is ufed for a park, *q. d.* a field of deer.

DEREGE, in *Geography*, an ifland of the Red fea: low and covered with grafs; but round like a fhield, whence its name. It lies between the ports of Sibt and Djezan.

DEREHAM, East, or *Market-Dereham*, is a market town and parifh in the hundred of Midford in the county of Norfolk. It is 16 miles from Norwich, and 101 north-eaft from London. In the year 1801, it contained 518 houfes, and 2505 inhabitants. This place has fuftained confiderable injury by fires; firft in the year 1581, when nearly the whole town was deftroyed; and again in 1679, when about 20,000 *l.* worth of property was confumed. The houfes fince built have been rendered more commodious, and the town by paving, &c. more pleafant. A nunnery is faid to have been founded here in 700, and deftroyed by the Danes in 974. The manor is called Dereham-Reginæ, and is invefted in the crown. Here are a weekly market on Friday, and two annual fairs. The parifh-church is an ancient building: and contains fome curious relics. William Cowper, the poet, was buried here in 1800. In the town are three modern meeting houfes. Blomefield's Hiftory of Norfolk.

DEREIGNMENT, or Deraignment, in *Law*. The fubftantive dereinment is fometimes ufed in the fame fenfe with the French defrayer or defranger; that is, to difplace or fet out of order. Thus we find deraignment or departure out of religion, ann. 31 Hen. VIII. c. 6. and 5 and 6 Edw. 6. c. 13. Thus alfo we meet with dereinment or difcharge of their profeffion, 35 Henry VIII. cap. 29. which is faid of thofe religious men who forfook their orders or profeffion. See Kitchin, fol. 152. The leffee enters into religion, and afterwards is deraigned. And Briton, c. 21. ufes femonenfe defrenable, for a fummons that may be challenged as defective, or not lawfully made. Skene, De Verb. Signific. verbo difrationare, makes it fignify what we call waging and making of law.

DERELICTS, from *de*, and *relinquo*, I leave, in the *Civil Law*, are fuch goods as are wilfully thrown away, or relinquifhed by the owner.

Derelict is alfo applied to fuch lands, as the fea receding from, leaves dry, and fit for cultivation.

If they are left by a gradual recefs of the fea, they are adjudged to belong to the owner of the adjoining lands: but when an ifland is formed in the fea, or a large quantity of new land appears, fuch derelict lands belong to the king. See on this fubject the article Alluvion.

DERELSIDE, in *Botany*, a name by which fome authors have called the tamarind-tree. Alpin Egypt. p. 328.

DEREMISTÆ, in *Ancient Geography*, the name of a people who inhabited the interior of Illyria.

DEREMMA, a town of Afia, in Mefopotamia.

DERENBURG, in *Geography*. See Dernbourg.

DERENPERG, a town of Germany, in the archduchy of Auftria; three miles S. of Ebenfurth.

DEREON, in *Ancient Geography*, a fmall place of Thrace, upon the Euxine fea, at the extremity of Macron-Tychos.

DERETINI, a people of Illyria, placed by Ptolemy in Dalmatia.

DEREVIANNOE, in *Geography*, a town of Ruffia, in the province of Ufting, on the Vitchegda; 76 miles E. of Uft Sifolfk.—Alfo, a town of Ruffia, in the government of Olonetz, on the W. coaft of lake Olonetz; 12 miles S. of Petrovadfk.

DE REVOCATIONE Parliamenti, the name of a writ for recalling a parliament. Thus in 5 Edw. III. the parliament being fummoned, was recalled by fuch a writ before it met. Vide Pryn's Animad. on the 4 Inft. f. 44.

DEREWNEA, in *Geography*, a town of Lithuania, in the palatinate of Novogrodek; 42 miles E. N. E. of Novogrodek.

DEREYN, or Deraign, difrationare vel dirationare, in our *Old Laws*, is generally ufed for the act of proving: thus we find dirationabit jus fuum hæres propinquior. Glanv. lib. ii. c. 6. And, dirationavit terram illam in curia mea. Id. lib ii. c. 20. Bracton ufes it in the fame fenfe. Habeo fufficientem difratiocinationem et probationem, lib. iv. tract 6. c. 16. And fo he makes ufe of difrationare, lib. iv. c. 22. And we find to dereyn the warranty in Old Nat. Br. fol. 146. To deraign that right, 3 Edw. I. c. 4, and Weftmin. tom. ii. c. 5. When the parfon of any church is difturbed to demand tithes in the next parifh, by a writ of indicavit, the patron fhall have a writ to demand the advowfon of the tithes, being in demand; and when it is deraigned, then fhall the plea pafs in the court Chriftian, as far forth as it is deraigned in the king's court.

DERG, in *Geography*, a river of Ireland, which rifes in the county of Donegal, and having paffed through a lake of the fame name, enters the fouth-weftern angle of Tyrone, and after a courfe of a few miles, unites its waters to thofe of the Mourne.

Derg, *Lough*, a lake of Ireland, in the fouthern part of the county of Donegal, which contains feveral iflands, one of which is remarkable for St. Patrick's purgatory. This ifland is but 126 yards long by 44 broad, and the cave, which is called the purgatory, is 16 feet and a half by two wide, and fo low that a tall man cannot ftand erect in it. It holds exactly nine perfons; and a tenth could not remain in it without great inconvenience. The floor is the natural rock, and the whole is covered with large ftones and fods. It was imagined in the dark ages, that "whoever repented and was armed with true faith, and entering that pit continued there a night and a day, fhould be purged from all his fins, and alfo during his abode there, fhould not only fee the pains of the damned, but the joys of the bleffed." There were alfo in the ifland a monaftery for regular canons of St. Auftin, feven chapels, and fix churches dedicated to St. Patrick and other faints. The cell was demolifhed in 1497, by order of pope Alexander VI., and in 1630, the lords juftices ordered it to be broken open; the monks were driven away; and it was left in ruins. The place, however, ftill continues to be frequented in the month of May, June, and July. This ifland, the lake, and river, are all fuppofed by fome antiquaries to have derived their name from *dearg* or *dirg*, a cave, and the cave to be fpoken of in the Puranas of the Indian Bramins. Mr. Wilford confiders Ireland as the Suvarneya of the Puranas. Suvarneya was from the earlieft periods confidered as the abode of the Pitris (*i. e.* fathers or manes). A place where the pitris could be feen, is pofitively declared to be a narrow cave in a fmall ifland in a lake, the waters of which were bitter. In it was the entrance of the Dirghe, or long paffage into the infernal regions, which is often mentioned in the Puranas. The name Dirghe, and the defcription of the cave, certainly much refemble that in Ireland, whilft the change of Pitris to Patricius is lefs difficult than many changes which have occurred in proper names. Still it feems incredible that Ireland fhould have been known to the Indians, and connected in any way with their fables. Ware and other antiquarians maintain the Pagan origin of the ceremony, and Dr. Ledwich, who denies that fuch a perfon as St. Patrick ever exifted, fuppofes the ftory of the cave to be "a pagan tale of purgatory trumped up with every circumftance that could work on the hopes and fears" of the Irifh, fo as to render them more obedient to papal authority. Here then the learned doctor

 and

and his refpectable antagonift (general Vallancey) are not much at variance, could the former admit the oriental origin of what both confider as a relict of paganifm. The moft difcouraging circumftance attending difcuffions of this kind, is, that as on one hand, after much labour employed in inveftigation, certainty cannot be attained, fo on the other, if it could, it would be attended with no practical benefit. For, of what confequence is it, whether the purgatory were an eaftern or weftern fable; whether it originated with a real St. Patrick, or was a fiction of a later age. Ledwiche's Antiquities of Ireland, Vallancey's Profpectus of a Dictionary of the Irifh Language.

DERGHAS, a town of Perfia, in the province of Segeftan; 120 miles E.S.E. of Zareng.

DERGUY, Le, a town of France, in the department of the Aveiron, and diftrict of Rodez; 5 leagues S. of Rodez.

DERHAM, William, in *Biography*, a celebrated divine of the church of England, was born at Stowton, near Worcefter, in the year 1657. The elementary parts of his education he had at Blockley, but he purfued the ftudies preparatory to his profeffion at Trinity college, Oxford. Here he diftinguifhed himfelf by his induftry and talents. In 1681, as foon as he had taken orders, he was appointed chaplain to lady dowager Grey Warke, and in the following year he was prefented to the vicarage of Wargrave, in Berkfhire, and in 1689 to the more valuable living of Upminfter in Effex. In this place he applied himfelf, with great ardour, to the purfuit of natural fcience, in which he afterwards greatly excelled. He was foon noticed by the fcholars of the age, and introduced to the Royal Society, of which he proved one of the moft ufeful members. Among his earlieft publications was "The Artificial Clock-Maker, a Treatife on Watch and Clock-Work, &c." which has gone through many editions. In the years 1711 and 1712, he was appointed preacher at Mr. Boyle's lecture, and in the following year he publifhed, in a new form, the fermons he had delivered, under the title of "Phyfico-Theology, or Demonftration of the Being and Attributes of God from his works of Creation." This was followed by a work, having the fame defign in view, entitled "Aftro-Theology, or a Demonftration of the Being and Attributes of God, from a Survey of the Heavens." Thefe volumes are too well known to require from us any particular account of their contents. Few books can be put into the hands of young perfons with greater advantage. Upon the acceffion of George I., Mr. Derham was made chaplain to his majefty, and foon after appointed one of the canons of Windfor. In the year 1730, the degree of doctor of divinity was conferred on him by the univerfity of Oxford. The other works of Dr. Derham were entitled to the applaufe of every friend to virtue and religion. He lived highly refpected and efteemed by his contemporaries, and has obtained for himfelf an unfading reputation. He died in the year 1735, and was buried at Upminfter. As a preacher, he is faid not to have excelled; his perfon was rather deformed, and his manner and delivery ungraceful, but his life and labours were rendered highly fubfervient to the intereft of religion and unfeigned piety. Biog. Brit.

DERIBIA, in *Ancient Geography*, a town of Afia Minor, in Lycaonia, which had been epifcopal under the metropolis of Iconium.

DERIVATIO, in *Rhetoric*, is a figure in which words that are derived from the fame root come together in the fame fentence. The figure is repeated in the following example: "He wifhed rather to die a prefent death, than to live a miferable life."

DERIVATION, from *de*, and *rivus*, *a ftream*, in *Grammar*, the affinity one word has with another, by having been originally formed from it.

Derivation, in *Phyfiology*, the drawing of a humour from one part of the body to another. It was fuppofed by the ancients that difeafes arofe from humours flowing into and varioufly affecting the difeafed parts; and, confequently, that the mode of cure confifted in removing fuch humours. This they attempted, in various inftances, by indirect means, as the application of blifters to neighbouring parts, &c. The operation of fuch curative methods was referred to the principle of derivation: humours in the head were faid to be drawn out by blifters in the neck; and the difcharges by the kidnies, inteftines, and fkin, were all confidered as fo many outlets by which noxious humours could be expelled. The more correct views of the animal economy entertained by modern phyfiologifts have banifhed all thofe vifionary notions, which are to be regarded as mere flights of fancy, and totally unfupported by either facts or reafoning. The humoral pathology has been entirely overthrown, and the ideas of derivation, founded on that fyftem, have, of courfe, fallen with it. Yet the vafcular fyftem feems to be fubject to an influence, which may be denominated that of derivation. Where the blood-veffels of different parts communicate together, the removal of blood from one fet has a powerful operation in emptying the others; and feveral experiments feem to prove that this influence is much more active than we fhould have fuppofed. (See the article Circulation.) This is an important point in practice, as the utility of local blood-letting depends on it. This is ftrictly local only in affections of the fkin; in all other inftances the blood is drawn from veffels connected with thofe of the difeafed organ; and the latter can only be influenced by the way of derivation. Thus it is, that opening the temporal artery acts in affections of the eye and brain; cupping the head or neck in difeafes of the brain, &c.

Derivation. See Angle.

DERIVATIVE, in *Grammar*, a word which takes its origin from another word, called its *primitive*.

Such is the word derivative itfelf, which takes its origin from the primitive *rivus*, a rivulet, or channel, out of which leffer ftreams are drawn; and thus *manhood*, *deity*, *lawyer*, &c. are derived from *man*, *deus*, *law*, &c.

Derivative, or *Secondary Conveyances*, in *Law*, are thofe which prefuppofe fome other conveyance precedent, and only ferve to enlarge, confirm, alter, reftrain, reftore, or transfer the intereft granted by fuch original conveyance. Thefe are *releafe*, *confirmation*, *furrender*, *affignment*, and *defeazance*.

Derivative *Mountains*, or *ftrata*, in *Geology*, according to Mr. Kirwan (Geol. Eff. 226.) are fuch as, being formed fubfequently to the production of organic fubftances, originated from difintegration, and the principal character by which fuch are diftinguifhed, confifts in their exhibiting vegetable fubftances, or petrifactions, or land-fhells, as thofe of fnails, or fluviatile fhells, with either none, or fcarce any, marine remains: the futility of thefe diftinctions a writer in the article Colliery has endeavoured to fhew.

DERKUL, in *Geography*, a river of Ruffia, which runs into the Donetz; 36 miles S. of Bielovodfk.

DERMA, in *Anatomy*, a name given to the cutis, or true fkin. It is derived from δερω, *I excoriate*. See Integuments.

DERMATO-LOGIA, a difcourfe on the fubject of the fkin; from δερμα, *the fkin*, and λογος, *a difcourfe*.

DERMATODEA, in *Botany*, Ventenat Tabl. v. 2, 34. A genus formed by Ventenat of the *Lichen caninus*, and

and its near allies (Dill. Musc. t. 27, 28. f. 102—109.) called by Acharius *Peltidea*. The former erroneously comprehends *L. pulmonarius* under this genus, which is otherwise tolerably natural, and will probably be retained under its Acharian name.

DERMBACH, or Thermbach, in *Geography*, a small and anciently fortified town of Germany, in the bishopric of Fulda, and circle of the Upper Rhine, which now belongs to the new kingdom of Westphalia.

DERMESTES, in *Entomology*, a genus of coleoptera. These have the antennæ clavate, the club perfoliated, and three of the joints thicker than the others: the thorax convex and slightly margined: head inflected and concealed under the thorax. Linn. Gmelin divides the dermestes genus into two families; the first including those with the jaw bifid, the other such as have the jaw armed, with a single tooth. In the Entomologia Britannica of Marsham they constitute three families, one of which is distinguished by having the body oblong; the two other have the body ovate, but one has the extreme joint of the antennæ obtuse, and the other rather pointed. The Linnæan genus dermestes contains a number of insects, described by Thunberg under the title of Anobium, and of the Ips of Olivier, and Ligniperda of Pallas. Fabricius forms several genera of the Linnæan dermestes.

The greater number of the dermestes tribe subsist in the larva state on the dried skins of animals, and indeed on almost any kind of animal substances; they are exceedingly destructive to leather, and also to timber, and some of the species are too well known from the havoc they occasion among books and furniture. A few kinds are found on flowers.

Species.

Lardarius. Black; anterior part of the wing-cases cinereous, with a black dot on each. Linn., &c.

It is this insect chiefly that infests the dried skins, and other preparations of animals, birds, &c. preserved in museums; and it is also found in old bacon, and other animal substances. The larva is oval and hairy, and it is in this state the insect does mischief.

Elongatus. Black; wing cases at the base and posterior band livid; antennæ and legs ferruginous. Linn. Fn. Suec. Native of Europe.

Undatus. Oblong and black; wing-cases with a double white waved band. Linn. Oliv. Found chiefly in rotten animal substances in Europe.

Pellio. Black; a white spot on each wing-case. Linn. Donov. Brit. Inf. *Dermestes bipunctatus*, Degeer.

The larva of this kind is oblong, and hairy, with the tail bristly; its manners of life are similar to those of dermestes lardarius; and it likewise inhabits Europe.

Macellarius. Black, smooth; legs pitchy. Fabr. Resembles D. lardarius, and is found in Germany.

Cadaverinus. Black; mouth ferruginous. Fabr. Found in St. Helens; the antennæ are brown with the club ferruginous, and the abdomen cinereous beneath.

Carnivorus. Black; anterior part of the wing-cases testaceous; abdomen white. Fabr.

Inhabits New Holland and New Zealand. The antennæ are brown, with the club ferruginous; head and thorax black, at the sides grey; legs black.

Trifasciatus. Ovate and black; wing cases with three waved cinereous bands. Fabr. *Byrrhus fuscus*, &c. Geoffr.

Inhabits Europe. The margin of the thorax in this species is cinereous at the base, and the wing-cases marked with a cinereous dot at the tip.

20 Guttatus. Oblong, and black with twenty white dots. Fabr.

Found in Saxony. Nine of the white dots are disposed on each of the wing cases, and one on each side of the thorax.

Bicolor. Oblong and black, beneath testaceous; wing-cases striated. Fabr. Inhabits Germany.

Domesticus. Black; wing-cases greyish with black margin; thorax villous. Linn. Fn. Suec. Native of Europe.

Violaceus. Blueish-black; thorax downy; Linn. Fn. Suec. *Clerus nigrocæruleus*. Geoff.

Frequent in decayed animal substances, and sometimes found on flowers. A native of Europe.

Rufipes. Blueish-black; thorax downy; legs rufous. Fabr. *Anobium rufipes*, Thunb.

Found in Africa, and seems to be a variety of dermestes violaceus.

Ruficollis. Violaceous; thorax and wing-cases rufous at the base. Fabr. Native of Africa and India.

Cæruleus. Blue, hairy, and linear. Fabr. *Anobium cæruleum*, Thunb. Found in the Cape of Good Hope.

Hirtus. Deep black, and hairy. Gmel. *Lagria atra*, Fabr. Native of Europe.

Fenestralis. Chesnut; head blackish; thorax fuscous. Linn. *Byrrhus fenestralis*, Müll.

Commonly found crawling on the frames of windows in the northern parts of Europe.

Vulpinus. Oblong, smooth, and black; sides of the thorax cinereous downy; beneath whitish. Fabr. Native of the Cape of Good Hope.

Felinus. Oblong, cinereous, downy and immaculate. Fabr.

Found in Van Diemen's land, and is nearly allied to the species Vulpinus.

Murinus. Oblong, downy, black and white clouded; abdomen snowy. Fabr.

The larva is brown with the mouth deep black; and is frequent in rotten animal substances.

Tessellatus. Oblong and downy, fuscous and cinereous clouded; abdomen fuscous. Fabr.

Navalis. Elongated; ferruginous brown, with the eyes black. Fabr. Native of New Zealand.

Scaber. Greyish; thorax and wing-cases scabrous. Fabr. Inhabits the same country as the former.

Testaceus. Oblong, testaceous; eyes and abdomen at the base black. Fabr. Native of Holland.

Fumatus. Oblong testaceous; eyes black. Linn. Fn. Suec. *Dermestes rosæ*, Scop. Found on flowers in Europe.

Picipes. Oblong blackish; legs pitchy. Fabr. Inhabits Saxony.

Chinensis. Oblong ferruginous; wing-cases striated. Fabr. Found in seeds brought from China.

Paniceus. Oblong ferruginous; eyes rufous. Linn. Fn. Suec. Larva ovate, white and glossy. Inhabits Sweden.

Ferrugineus. Oblong ferruginous, and nearly cylindrical; wing-cases abbreviated. Linn. Fn. Suec.

Eustatius. Deep black, glossy, and very obtuse; less ferruginous. Gmel. Found on fungi in the isle of St. Eustatius.

Pedicularius. Oblong testaceous; wing-cases abbreviated. Linn. Fn. Suec. Frequent on flowers in Europe.

Fuscus. Oblong, villous, fuscous and immaculate. Fabr. Inhabits Saxony.

Tomentosus. Oblong, villous and grey; head with two brown dots. Fabr. Found in England and other parts of Europe.

Sangui-

SANGUINICOLLIS. Elongated, hairy and violaceous; thorax and abdomen rufous. Fabr. Native of Saxony.

LIMBATUS. Fufcous; wing-cafes dotted; border cinereous. Fabr. A fmall fpecies found in New Zealand.

SCANICUS. Deep black; thorax and two dots on the wing-cafes teftaceous. Fabr. Inhabits Germany and Sweden.

COLON. Thorax at the fides yellow; wing-cafes grey, with a black dot. Found in Europe.

SURINAMENSIS. Teftaceous; wing-cafes ftriated; thorax with three elevated ftriæ, and margin denticulated. Gmel. Rolander, &c.

This is of a very fmall fize and oblong form, and inhabits Siberia and Surinam.

HEMIPTERUS. Wing-cafes abbreviated; exterior bafe, with the tip teftaceous. Roland.

About the fame fize, and inhabits the fame country as the preceding.

BIFASCIATUS. Black; wing-cafes with two waved yellow ftreaks; thorax teffellated with cinereous. Thunb. Native of the Cape of Good Hope.

INTERRUPTUS. Black; band at the bafe of the wing-cafes red and interrupted. Thunb.

BIPUSTULATUS. Deep black and gloffy; head, thorax, and dot at the bafe of the wing-cafes red. Thunb.

MARGINATUS. Black; thorax at the fides, breaft, and incifures of the abdomen white. Thunb.

PICEUS. Entirely ferruginous; wing-cafes ftriated. Thunb. Native of the Cape of Good Hope.

CAPENSIS. Deep black and hairy; wing-cafes flexile and violet, with two white bands. *Anobium capenfe*, Thunb. A fmall fpecies found in the fame country as the former.

CAFER. Black and glabrous; wing-cafes with two yellowifh bands. Gmel. *Anobium bifafciatum*, Thunb. Native of the Cape of Good Hope.

VIRIDIS. Green and hairy; legs red. Thunb. Native of India and Africa.

FIMETARIUS. Yellowifh brown; thorax margined; antennæ and legs bay. Herbft. Found on dung and flowers near Berlin.

CELLARIS. Brownifh; antennæ long; wing-cafes ftriated. Scop. Found in Germany.

LONGICORNIS. Fufcous; antennæ long; thorax excavated in the middle; wing-cafes dotted. Herbft. Inhabits near Berlin, and is nearly allied to the latter.

FLAVESCENS. Ferruginous, beneath yellowifh; head dufky; eyes black; thorax rounded. Schranck. Inhabits near Bavaria.

FULVIPES. Deep black, oblong; wing-cafes dotted; legs fulvous. Schranck. Gmel. &c.

SULCATUS. Fufcous red; eyes black; wing-cafes fulcated and dotted. Thunb. Native of Sweden.

FENESTRATUS. Fufcous; wing-cafes with fixteen pale fpots; all the fhanks fpinous. Thunb. Found near Upfal.

RUBER. Red, thorax gloffy, ferruginous black, with the fides rufous. Thunb. A very fmall fpecies. Inhabits Upfal.

LINEARIS. Body and wing-cafes linear and ferruginous; head and thorax fufcous. Thunb.

ATER. Black and fhining; wing-cafes finely punctated; Thunb. Size of a fmall coccinella. Found near Upfal.

BIPUSTULATUS. Black; head and thorax red; wing-cafes black with a red fpot at the bafe. Thunb.

FASCIATUS. Black; wing-cafes with two yellowifh waved bands of yellow. Thunb.

MURICATUS. Wing-cafes reticulated, behind retufe and denticulated; thorax muricated and gibbous. Gmel. *Ligniperda terebrans*, Pallas. Found on the fugar-cane in South America.

HAMATUS. Wing-cafes before the tip armed with a fingle fpine; anterior edge of the thorax furnifhed with two hooks, and dentated. Lives in decayed wood in Saxony.

MONACHUS. Wing-cafes obtufe; thorax gibbous and truncated. Fabr.. *Ligniperda cornuta*, Pallas. Found on wood in South America.

JESUITA. Wing-cafes entire, and variolous; thorax truncated in front. Fabr. Native of New Holland.

INDICUS. Wing-cafes entire, and black; anterior part of the thorax fcabrous. A fmall fpecies found in Coromandel.

MINUTUS. Black; wing-cafes entire, and pitchy; anterior part of the thorax fcabrous. Fabr. Native of New Zealand.

EXILIS. Wing-cafes entire and pale, the whole margin black. Fabr. Found in Germany.

VILLOSUS. Thorax villous; wing-cafes entire and fufcous. Fabr. Native of Saxony.

PALLIPES. Oblong, flat, deep black and gloffy; antennæ and legs teftaceous. Fabr.

LUNATUS. Oblong, and black; a cinereous lunule on the back of the wing-cafes. Fabr. A fmall fpecies found under the bark of trees in Sweden.

RUFICORNIS. Fufcous; head retracted; antennæ and legs rufous. Linn. Native of Europe.

RUFIPES. Black; wing-cafes ftriated; fhanks and feet rufous. Marfh. Ent. Brit.

FLAVESCENS. Teftaceous and downy; eyes black. Marfh. Ent. Brit.

4-MACULATUS. Black; wing-cafes with two black fpots on each. Marfh. Ent. Brit.

SORDIDUS. Dull pitchy; head black; wing-cafes ftriated. Marfh. Ent. Brit.

ATRICAPILLUS. Teftaceous rufous; head deep black; wing-cafes teftaceous and ftriated. Marfh. Ent. Brit.

CONVEXUS. Black; head and thorax convex. Marfh. Ent. Brit.

CONCINNUS. Deep black and fhining; thorax and margin of the wing-cafes teftaceous. Marfh. Ent. Brit.

HYPOMELANUS. Rufous; abdomen black. Marfh. Ent. Brit.

CASTANEUS. Deep black; wing-cafes chefnut. Marfh. Ent. Brit.

PALLIDUS. Teftaceous and pubefcent; wing-cafes punctured. Marfh. Ent. Brit.

DERMONES, in *Ancient Geography*, a people of Interior Libya.

DERNBACH, in *Geography*, a fmall town of the grand duchy of Heffe Darmftadt, in Germany, in the circle of the Upper Rhine, nine miles of Marpurg.

DERNBURG, or DERENBURG, a fmall town of Germany, in the principality of Halberftadt, on the river Holtzemme; fix miles S.W. of Halberftadt. It now belongs to the new kingdom of Weftphalia.

DERNE, probably *Derrhis extrema*, according to Strabo and Ptolemy, a town of Africa, and capital of a diftrict of the fame name, in the country of Tripoly, near the coaft of the Mediterranean: the refidence of a Sangiac. This place was formerly much more confiderable than it is now, and it was built by the Moors, after they were driven out of Andalufia. It ftands about half a mile from the fea, and is furrounded by fome fprings of fweet water; fo that it is a territory capable of bearing fome corn and garden-ftuff, neverthelefs it is poorly inhabited. The diftrict extends from cape Bomb eaft, to the gulf of Bengufi weft, above 100 leagues

leagues and ftill farther inland. It is chiefly inhabited by wandering Arabs, to the amount of 30,000 families, who pay a fmall tribute to the bey of Tripoly. It is almoft every where covered with a kind of plant or fhrub, which bears a downy leaf, and a yellow flower that blows the greateft part of the year. The bees chiefly feed upon this flower, which gives an excellent tafte to their honey. N. lat. 32° 55′. E. long. 22° 55′.

DERNETAL. See DARNETAL.

DERNIER RESSORT, in *Law*, &c. See RESSORT.

Whatever power is committed by the king to any other, the dernier reffort is ftill remaining in himfelf; fo that he may fit in court and take cognizance of all caufes: except in treafons, and other cafes, where he himfelf is a party.

DERNIS, or DERNISCH, in *Geography*, a town and fortrefs of Dalmatia, fituated on a mountain near the river Kerka, taken from the Turks by the Venetians in the year 1684.

DEROGATION, from *derogo*, an act contrary to the preceding one, and that annuls, deftroys, and revokes it, either in whole, or part.

Derogations, in general terms, are not regarded in judicature; they muft be in fpecific, and in formal terms.

A new law imports a derogation of a former one: a fecond teftament is a derogation of a firft.

DEROGATORY, a claufe importing derogation.

By the French law, if a perfon own himfelf indebted in a certain fum; notwithftanding any quittance he has obtained for the fame, the act is derogatory.

DEROTE, in *Geography*, a town of Egypt, fituated in an ifland formed by the canal between Cairo and Rofetta. N. lat. 30° 40′. E. long. 31° 44′.

DERPT. See DORPAT.

DERRA, a town of Arabia, in the country of Yemen; 46 miles S.E. of Loheia.

DERRHA, or DERRHINI, in *Ancient Geography*, a place of the Peloponnefus, in Laconia, which gave name to the temple of Diana Derrheatis. Steph. Byz. It was fituated on mount Taygates, in the vicinity of the town of Lapithæa, according to Paufanias. It had a ftatue of Diana.—Alfo, a town of Macedonia, on the Thermæan gulf. Pliny.

DERRHÆ, a people of Arabia Felix. Ptolemy.

DERRHIMA, a town of Afia, in Syria.

DERRHIS, a promontory of Africa, in Marmarica. See DERNE.

DERRICK, in *Ship Rigging*, a tackle ufed at the outer quarters of a mizen-yard, confifting of a double and fingle block, connected by a fall: alfo, a diagonal fhore, as a fupport to fheers; alfo, a fingle fpar, top-maft, or boom, raifed upright and fupported by guys at the head, from whence hangs a tackle over the hatchway, the heel working in a focket of wood, faftened on the deck.

DERRIK, in *Geography*, a town of Perfia, in the province of Ghilan, 150 miles N.W. of Refhd.

DERRIS, in *Botany*, (δέρρις, a fkin, from the membranous legume,) Loureiro Cochinch. 432. Clafs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminofæ*, Juff.

Gen. Ch. *Cal.* Perianth tubular, coloured, its border erect with five notches. *Cor.* papilionaceous; petals four, nearly equal in length; ftandard ovate; wings oblong; keel lunate; all falcate at the bafe, and ftanding on flender claws. *Stam.* Filaments 10, all connected into a fheath, equal, fhort; anthers of two round lobes. *Pift.* Germen oblong, compreffed; ftyle equal to the ftamens; ftigma fimple. *Peric.* Legume oblong, obtufe, remarkably compreffed, membranous, fmooth. *Seed* one, oblong, flat.

Eff. Ch. Cal. with five notches, coloured. Petals with thread-fhaped claws. Legume oblong, membranous.

1. D. *pinnata.* "Climbing. Leaves pinnate. Stalks many-flowered, lateral." Lour. A climbing fhrub found in the woods of Cochinchina. Stem long, much branched, without thorns. Leaves alternately pinnate, of numerous fmall leaflets, which are ovate-oblong, fquare at the bafe, fmooth, and entire. Flowers white. The root is red and flefhy, and ferves to fupply the place of the betle nut, *areca*, being chewed by the natives of the country along with the aromatic leaf of the *piper betle*, in order to render the breath fweet, and the lips red. Lour. 2. D. *trifoliata.* "Climbing. Leaves ternate. Clufters long, axillary." Lour. Found in woods in the province of Canton, China, where it is called *Sān leâo tâu.* Stem fhrubby, climbing, branched, without thorns, fpringing from a long, fubdivided, flefhy root. Leaves ternate, ovato-lanceolate, entire, fmooth. Flowers in long axillary clufters, with white calyx, as well as petals. Germen with the rudiments of two or three feeds. Lour.

DERRY. See LONDONDERRY.

DERRY. The name of an Irifh bifhopric in the province of Armagh, which was conftituted in the year 1158, and was firft called Darrich. Its greateft length is 47, and its greateft breadth 43 Irifh miles, including the greateft part of Londonderry, with a part of Donegal and Tyrone. The bifhop's patronage is confiderable, and his revenue is the greateft, except the primacy, being faid to exceed 7000 *l.* *per ann.* Amongft thofe who have filled the fee was Dr. Nicholfon, the author of the hiftorical libraries of England, Scotland, and Ireland, a prelate of great erudition. The fee of Derry contains 659,000 acres, which are divided into 48 parifhes. By unions thefe are reduced to 43 benefices, but it is to the honour of the diocefe that there are 51 parifh churches and 33 glebe houfes, whilft there is only *one* entirely without glebe. Beaufort.

DERRY, a townfhip of America, in Pennfylvania, in the county of Dauphin, on the E. fide of Swetara creek, two miles above its confluence with the Sufquehanna, famous for its cave; containing 1666 inhabitants.—Alfo, a townfhip of Pennfylvania, in the county of Mifflin, containing 1135 inhabitants.—Alfo, a townfhip in the county of Northumberland, containing 1570 inhabitants.—Alfo, a townfhip in the county of Weftmoreland, containing 2093 inhabitants.

DERRY, *Dery*, or *Defry*, a river of North Wales, which runs into the ocean near Dolgelly, in Merionethfhire.

DERRYFIELD, a townfhip of America, in New Hampfhire, on the E. bank of Merrimack river, incorporated in 1751, and containing 557 inhabitants; 42 miles W. of Portfmouth.

DERSÆI, in *Ancient Geography*, a people of Thrace, N. of Abdera.

DERSENA, in *Geography*, a town of Perfia, in the province of Segeftan; 228 miles S. W. of Zareng.

DERTHA, a town of Perfia, in the province of Segeftan; 120 miles E. N. E. of Zareng.

DERTONA, or ZORTONA, in *Ancient Geography*, a town of Italy, taken poffeffion of by Alboin, king of the Lombards, in the year 370.

DERTOSA, or TORTOSA, a town of Hither Spain, fituated at a fmall diftance from the mouth of the Iberus. It was a colony, and made municipal by Scipio. It was under the protection of Pan.

DERVAL, in *Geography*, a fmall town of France, in the department of the Lower Loire, near Chateaubriant, 24 miles

miles S. of Rennes. It reckons 1553 inhabitants, and is the chief place of a canton, which upon a territorial extent of 235 kiliometres, comprifes fix communes, and a population of 7078 individuals.

DERVENTIO, DERWENT, a fortified town of the ifland of Albion, belonging to the Brigantes.

DERVERAGH LOUGH, or *Derrivarach*, a lake of Ireland, in the county of Weftmeath, which is faid to be remarkable for its bream, and other fifh. It receives the river Inny, and fome fmaller ftreams, and its fuperfluous water is difcharged by the Inny which falls into the Shannon. On its banks was Fahatty, to which Mortimer, earl of March, who was the intended fucceffor of Richard II., retired on the depofition of that prince. On a fmall river, near this lake, was the celebrated abby of Multifernan, at which feveral meetings were held previous to the infurrection of 1641.

DERVIS, or DERVICH, a name given to a fort of monks among the Turks, who lead a very auftere life, and profefs extreme poverty; though they are allowed to marry. The word is originally Perfian, דרויש, fignifying a beggar, or perfon who has nothing: and becaufe the religious, and particularly the followers of Mevelava, profefs not to poffefs any thing, they call both the religious in general, and the Mevelavites in particular, Dervifes, or Derviches.

The Dervifes, called alfo Mevelavites, are a Mahometan order of religious; the chief, or founder whereof, was one Mevelava. They are now very numerous. Their chief monaftery is that near Cogna in Natolia, where the general makes his refidence, and where all the affemblies of the order are held; the other houfes being all dependent on this, by a privilege granted to this monaftery under Ottoman I. Thefe Mevelavites or Mevlevis are cloiftered, and live together in *Tekas*, or convents, though they have liberty to go out during their hours of recreation.

The Dervifes affect a great deal of modefty, patience, humility, and charity. They always go bare legged, and open-breafted, and frequently burn themfelves with hot irons, to inure themfelves to patience. They always faft on Wednefdays, eating nothing on thofe days till after fun-fet. Tuefdays and Fridays they hold meetings, at which the fuperior of the houfe prefides. One of them plays all the while on the flute, and the reft dance, turning their bodies round and round with the greateft fwiftnefs imaginable. Long cuftom to this exercife from their youth has brought them to fuch a habitude, that it does not difcompofe them at all. This practice they obferve with great ftrictnefs, in memory of Mevelava their patriarch's turning miraculoufly round, as they pretend, for the fpace of four days without any food or refrefhment, his companion Hamfa playing all the while on the flute: after which he fell into an extafy, and therein received wonderful revelations for the eftablifhment of his order. They believe the flute an inftrument confecrated by Jacob, and the fhepherds of the Old Teftament, becaufe they fang the praifes of God upon them. They profefs poverty, chaftity, and obedience, and really obferve them while they remain Dervifes; but if they choofe to go out, and marry, they are always allowed.

Baron De Tott fays, (Memoirs, vol. i.) that there are two kinds of thefe monks in Turkey, very diftinct from each other, and equally remarkable. The difference between them arifes from the difference of the rules impofed upon them by their refpective founders. That of the "Mewliach or Mevlevi dervifes" is to turn round, as we have already obferved, like whirligigs, to the found of foft mufic, and feek a holy intoxication in the giddinefs which muft naturally refult from this abfurd exercife, if the habit of thus turning round did not preferve them from dizzinefs and drunkennefs, which they have recourfe to the tavern to accomplifh. The rule of the other monks, named "Tacta-Tepen (beaters of boards, which perhaps at firft were their only inftruments) is more melancholy, and has more barbarity. It confifts in walking, folemnly in a row, one after the other, round their chapel, and pronouncing the name of God, with a loud voice and much exertion, at each ftroke on a drum, beaten for that purpofe; the ftrokes on which, growing gradually quicker, become at laft fo rapid, that thefe wretches are forced to undergo a violent labour of the lungs, and the moft devout never clofe the proceffion without fpitting blood. Their appearance is always fad and furly; and thefe monks are fo perfuaded of the fanctity of their practice, and fo certain of pleafing heaven by their howling, that they never look on the reft of mankind but with the moft profound contempt. All the Turkifh monks, fays M. Peyffonnel, in his ftrictures on Tott's Memoirs (Mem. vol. ii. p. 192.) are divided into two orders: *viz.* the *Mevlevis* above defcribed, and the *Bektachis*. The latter have no convents nor fixed habitations, but wander about through the country. They often attach themfelves to the great, and accompany the pachas in their travels: being kept by them in their houfes, and obtaining great confidence and influence. Many of thefe bektachis follow the army, when it takes the field; when the Janiffaries make any change in their motion, one of thefe begins the march. On fuch occafions they have commonly their feet, legs, and a part of the body naked; over their fhoulders they throw the fkin of a tiger, lion, or fome wild beaft; and carry in their hand a pike, halbert, or battle-ax; and as they march, fing verfes in praife of the *orta*, or regiment of Janiffaries, and offer up prayers for the glory of religion, and the profperity of the empire.

The generality of Dervifes are mountebanks: fome apply themfelves to legerdemain, poftures, &c. to amufe the people, others give into forcery and magic: but all of them, contrary to Mahomet's precept, are faid to drink wine, brandy, and other ftrong liquors, to give them the degree of gaiety their order requires.

Thofe Dervifes who have affurance fufficient to avail themfelves of the general ignorance of the Turks fet up for prophets; and if the event juftify the prediction which they hazard, they are held in great efteem as faints; and even thofe who, for want of fuccefs, can only pafs for fools, find, neverthelefs, admiffion every where. Nothing can refift their effrontery, nor exceed the impofition they practife on the fuperftitious multitude. The fanaticifm of the public obliges the moft enlightened perfons to fubmit: and the moft eminent Turks can only get rid of this rabble by giving them money, which ferves to make them more troublefome and more infolent.

Befides their great faint Mevelava, there are other faints honoured in fome particular monafteries; as Kiderle, greatly revered in the monafteries of Egypt, and held by fome to be St. George; and by others, with more probability, the prophet Elias.

The Dervifes are great travellers; and, under pretence of preaching and propagating their faith, are continually paffing from one place to another; on which account they have been frequently ufed as fpies.

There are alfo Dervifes in Perfia, called in that country *Abdals*, *q. d. fervants of God.* They lead a very penurious, auftere life, and preach the Alcoran in the ftreets, coffeehoufes, and wherever they can meet with auditors. The Perfian Dervifes retail little but fables to the people, and are in the utmoft contempt among the men of fenfe and letters.

There are in Egypt two or three kinds: thofe that are in

in convents, are in a manner of the religious order, and live retired; though there are of these some who travel and return again to their convents. Some take this character, and yet live with their families, and exercise their trades: of this kind are the dancing Dervises at Damascus, who go once or twice a-week to a little uninhabited convent, and perform their extraordinary exercises; these also seem to be a good people: but there is a third sort of them who travel about the country, and beg, or rather oblige people to give, for wherever they found their horn something must be given them. The people of these orders, in Egypt, wear an octagonal badge, of a greenish white alabaster, at their girdles, and a high stiff cap without any thing round it. Pococke's Egypt, p. 178.

DERUSIÆI, in *Ancient Geography*, a people of Asia in the Perside, according to Herodotus. Their situation is not precisely ascertained. Some geographers place them to the north of the Persian gulf, between the river Tigris to the west, and the Choaspes to the east.

DERUYTER, in *Geography*, a post-town of America, in Chenango county, and state of New York, S. of Cazenovia adjoining. It has 310 inhabitants.

DERWENT, a river in Cumberland, England, has its origin among the monstrous craggs at the head of Borrowdale, and after pouring its foaming stream over various precipices, its current is enlarged by several sister branches at the bottom of that romantic chasm through which it is dashed from rock to rock, till it flows into the Derwent lake. At the foot of this beautiful expanse of water, it unites with the Greata, and afterwards meanders through an extensive tract of meadow-land, till it reaches Bassenthwaite water, through which it pursues its silent course, and at length emerges at Ousebridge. Again confined in a rocky channel, it assumes a westerly direction, and flows through a narrow vale to Cockermouth, whence, being joined by the waters of the Cocker, it passes through a more open country to the sea, at Workington. The whole extent of this river affords varied and interesting scenery. This river is navigable from its mouth in the Irish sea for a short distance, and vessels are loaded in it with coals, brought down by several rail-ways from the mines in the neighbourhood of Workington.

Derwent, a river in Derbyshire, England, derives its source in the mountainous district of the High Peak, and is increased by various torrents which flow from the dreary waste that surrounds its spring. These unite near Hathersage in one stream, which taking a southern course, rather inclining eastward, emerges from its native wilds, and passing through Chatsworth park, has its current enlarged by the waters of the Wye. These united rivers then animate the pleasant vale of Darley, till their channel is suddenly ingulphed between those lofty rocks, which in their winding recesses inclose the romantic scenery of Matlock Dale.

> ————————" Here the High Tor
> Rears its mighty head, along whose broad bold base
> Impatient Derwent foams, among the craggs
> Roaring impetuous, till his force all lost,
> Gentle and still, a deep and silent stream,
> He scarcely seems to move: o'er him the boughs
> Bend their green foliage, shivering with the wind,
> And dip into his surface."

Emerging through a high portal of rocks at Cromford, the stream then flows through several deep vallies, till entering the cultivated vale which extends to Derby, it turns to the east, and flows into the Trent on the Leicestershire border near Wilne. The temperature of the water of the Derwent is observed to be higher than that of most rivers, a circumstance which is ascribed to the numerous warm springs that mix with the current.

This river was navigable from the Trent at Wilden Ferry to the town of Derby; but on the completion of the Derby canal, which opens two other water communications with the Trent river, the property in this concern was purchased by the canal company, and the river navigation discontinued. (See Canal.) A weir of stone, 100 yards long, is erected across this river, about $\frac{1}{4}$ of a mile below Derby bridge, (which is an elegant structure of stone with three large flat elliptical arches.) A sough is laid under this weir and the wharfs, for $\frac{1}{4}$ of a mile in length, with a wooden trunk over Moorledge brook, for feeding the southern part of the Derby canal, independent of the Derwent river, although the canal intersects the same, and barges can proceed up the course of the river to Darley.

Derwent *River*, in Yorkshire: this river is navigable from its efflux into the York Ouse river, at Barnby, to the town of New Malton, a distance of about 37 miles: by this navigation, about 40,500 tons of coals are annually carried up to New Malton, of which more than 20,000 tons are for burning lime from the lower beds of the chalk strata of Hurlock; earl Fitzwilliam's extensive brick-kilns near this town also consume considerable quantities of coal. See Canal.

Derwent, a river of *Van* Diemen's *land*; which see.

Derwent *Fells*, a mountain of England, in the county of Cumberland, celebrated for its mines of black lead, a little to the south of Keswick.

Derwent *Water*, a lake of England, in the county of Cumberland, formed by the river Derwent, about four miles long, and rather more than one wide, including several small islands, one of which is called Derwent; the northern part of the lake is very near Keswick.

DERXENA, in *Ancient Geography*, a country of Asia, in Armenia, towards the sources of the Euphrates: it is called Xerxena by Strabo and Steph. Byz.

DERY. See Derry.

DERYCK, or Derick, Peter Cornelius, in *Biography*, a painter of portraits, landscapes, and cattle, was born at Delft in 1568, and was a disciple of Hubert Jacobs. In Italy, whither he went for farther improvement, he studied the styles of the most eminent masters, and at last fixed on Bassan as his model. In copying and designing he spent 15 years at Rome, Venice, and other cities of Italy, where he painted a great number of pictures of different sizes. His portraits were much admired; but those pictures, which were executed in the manner of Bassan, were peculiarly commended for good design, firm and fine touch, and the spirit of those animals, which he introduced in his compositions. His distinguishing excellence consisted in his imitation of the style, manner, and tint of colouring of Bassan; which was so perfect that even good judges are often deceived by some of the pictures of Deryck. He died in 1630. Pilkington.

DESAGUADERO, in *Geography*, a river of Peru, in the province of Chucuito, formed by the termination of a kind of bay towards the S. part of the lake Titi-caca; over which is still remaining the bridge of rushes invented by Capac Yupanqui, the fifth Inca, for transporting his army to the other side, in order to conquer the provinces of Collasayo. The Desaguadero is here between 80 and 100 yards in breadth, flowing with a very impetuous current, under a smooth and tranquil surface. The Inca ordered four large cables to be made of a kind of grass, which covers the lofty heaths and mountains of that country; which cable was the foundation of the whole structure. Two of these cables being laid across the river, fascines of rushes were fastened together and laid across them. On these

thefe two other cables were laid, and covered with other fafcines, fecurely faftened, and fo arranged as to form a level furface ; and by this means he procured a fafe paffage to his army. This bridge, which is about five yards in breadth, and $1\frac{1}{2}$ above the furface of the water, is carefully repaired, or rebuilt every fix months, by the neighbouring provinces, in conformity to a law made by that Inea, and fince often confirmed by the kings of Spain, on account of its great ufe ; as it is the channel of intercourfe between the provinces feparated by the Defaguadero.

DESAGULIERS, John Theophilus, in *Biography*, a divine and experimental philofopher, was born at Rochelle in France, in the year 1683, but on account of the revocation of the edict of Nantz in 1685, he was at that early period of his life brought to England. He was initiated into the learned languages under his father, who afterwards fent him to Chrift-church, Oxford, where he took his degrees, and entered into deacon's orders in 1710 ; about the fame time he fucceeded Dr. Keil as lecturer in experimental philofophy. In 1712, he removed to London, where he introduced the practice of delivering lectures in the fciences, in which he continued, with much reputation and fuccefs, until his death. He was, fhortly after his removal to the metropolis, elected a fellow of the Royal Society, and in the year 1716, he was made chaplain to the duke of Chandos, who prefented him to the living of Edgware, and in the following year he had the honour of delivering a courfe of lectures before the king at Hampton Court. In this bufinefs he conducted himfelf fo very ably, and fo much to the fatisfaction of his majefty, that he promifed him fome preferment in the church by way of remuneration for his trouble. The moft, however, that he obtained was a fmall living in Norfolk, worth about 70*l. per annum*. From this period till his death, which happened in 1749, he was indefatigable in his experiments in natural philofophy ; many he exhibited before the Royal Society, and communicated to that learned body various valuable papers on mechanical and philofophical fubjects. He had taken his degree of doctor of laws at Oxford in the year 1718, and 1734 he publifhed, in two volumes quarto, " A Courfe of Experimental Philofophy." After this he edited Dr. Gregory's Elements of Catoptrics and Dioptrics. He next was called on to deliver his lectures, and exhibit his experiments before king George II. and the other branches of the royal family ; for this he was rewarded with a living in Effex. He was likewife appointed chaplain to Frederic, prince of Wales. In the year 1742, he publifhed a differtation on Electricity, which contained every thing that was known on the fubject at that time, for which he gained a prize given by the academy of Bourdeaux. Dr. Defaguliers tranflated into the Englifh from the Latin " Gravefande's Mathematical Elements of Natural Philofophy," which were publifhed in two volumes 4to. Notwithftanding the diligence of this gentleman, and the notice taken of him by the learned and the great, he died in poverty, though, perhaps, this was exaggerated by the poet Cawthorne, who, fpeaking of the neglected Defaguliers, fays,

> " How he, who taught two gracious kings to view
> All Boyle ennobled, and all Bacon knew,
> Died in a cell, without a friend to fave,
> Without a guinea, and without a grave."

Biog. Brit.

DESAIGNE, in *Geography*, a town of France, in the department of the Ardeche ; $5\frac{1}{2}$ leagues N. of Privas.

DESANA, a town of Italy, in the lordfhip of Vercelli ; 5 miles S.W. of Vercelli.

DESARENA, in *Ancient Geography*, a country of India, on this fide of the Ganges, according to Arrian.

DESART, in *Geography*. See Desert.

Desart, in *Cookery*. See Dessert.

DESAULT, Peter, in *Biography*, a native of Bourdeaux, where he was admitted doctor in medicine, and where he acquired reputation as a practitioner in that art, the beginning of the laft century, was author of feveral ufeful practical works, which are ftill fought for : " Nouvelles decouvertes concernant la feinte, et les maladies les plus frequentes," Paris, 1727, 12mo., a fort of family medicine ; he alfo wrote treatifes on the gout, and on the venereal difeafe, which latter he profeffes to cure without falivating the patients. " Differtation fur la pierre des reins et de la veffie," 1736, in 3 vols. 12mo. In this he defends his practice in the venereal difeafe, which had been cenfured. He is averfe to cutting for the ftone in the bladder ; which, he fays, may be diffolved, by giving the patients the water of Bareges to drink, and by injecting it into their bladders. We know thefe waters acquired great reputation as lithontriptics, and were fuppofed to be as powerful in relieving the pain to which perfons fuffering a fit of the ftone are fubjected, and in diffolving ftones lodged in the kidnies, or in the bladder, as Mrs. Stephens' medicine, lime water, and Caftile foap, which began alfo to be in vogue about this time. Though it is now known the waters do not diffolve the ftone, they are ftill ufed for their power in appeafing pain. In the fecond volume the author treats of the management of perfons bitten by rabid animals. He thinks the hydrophobia may be cured by mercurial frictions, but repeated trials have fhewn its total inefficiency in that dreadful difeafe. He oppofes, with propriety, opinions once very prevalent, that perfons in hydrophobia attempt biting their attendants, and that they make a noife refembling the barking of a dog, which certainly never occur. Haller Bib. Chirurg.

Desault, Peter, Joseph, furgeon in chief to the Hotel Dieu at Paris, publifhed, in conjunction with M. Chopart, " A Treatife on Chirurgical Difeafes, and on the Operations required in their Cure," in 2 vols. 8vo. in 1794. An indifferent tranflation into Englifh of the work, by Mr. Turnbull, was publifhed in 1797. The work is allowed to have confiderable merit. Default attended the young king of France, Lewis XVII., in the Temple. He died fuddenly, Feb. 1795, a very few days before his patient, not without ftrong fufpicions of his having been deftroyed, to prevent his difclofing the horrid fcenes it is fuppofed he muft have witneffed. The fuppofition is ftrengthened by learning that Chopart and Doublet, who had alfo vifited the unfortunate prince, both of them died about four days after the death of Default. Gent. Magazine for the year 1795.

DESCEBESADO, in *Geography*, one of the higheft mountains of the Chilefe Andes. See Chili.

DESCANT, from *de*, and *cantus*, *fong*, in *Mufic*, originally fignified an extemporaneous fong, which was no fooner uttered than loft ; but it was afterwards applied to the art of compofing in feveral parts.

Defcant is threefold ; *viz. plain*, *figurative*, and *double*.

Descant, *Plain*, is the ground-work, or foundation, of mufical compofition, and confifts altogether in the orderly placing of many concords ; anfwering to fimple counterpoint.

Descant, *Figurative*, or *florid*, is that wherein difcords are concerned as well, though not fo much, as concords. This may be well termed the ornamental, or rhetorical part of mufic ; becaufe, that in this are introduced all the va-

rieties of points, figures, ſyncopes, diverſities of meaſures, and whatſoever elſe is capable of adorning the compoſition.

Descant, *Double*, is when the parts are ſo contrived, that the treble may be made the baſs; and on the contrary, the baſs the treble. See Discant.

DESCENDANT, in *Genealogy*, a term relative to *aſcendant*, and applied to a perſon who is born or iſſued from ſome other referred to. Thus, mankind are ſaid to be deſcendants of Adam. The deſcendants from the brothers of the Maid of Orleans are confirmed in their exemption from all taxes and impoſts, by a regulation of the year 1634. See Descent.

DESCENDENS, Obliquus, in *Anatomy*, a name given by Fabricius, and others, to the muſcle, called by Albinus *obliquus externus abdominis*. See Obliqui, &c.

DESCENDER, *Writ of formedon in*. See Formedon.

DESCENDING, ſomething that falls or moves from above, downwards.

There are aſcending and deſcending ſtars; and aſcending and deſcending degrees.

There are alſo aſcending and deſcending veins ſpringing out of the cava (ſee Vein); and aſcending and deſcending arteries riſing out of the aorta. See Artery.

Descending *Latitude*, in *Aſtronomy*, is the latitude of a planet in its return from the nodes to the equator.

DESCENSION, is either *right* or *oblique*.

Descension, *Right*, *of a ſtar*, or *ſign*, is a point, or arc, of the equator, which deſcends with the ſtar, or ſign, below the horizon, in a right ſphere.

Descension, *Oblique*, is a point, or arch of the equator, which deſcends at the ſame time with a ſtar, or ſign, below the horizon, in an oblique ſphere.

Deſcenſions, both right and oblique, are accounted from the firſt point of Aries, or the vernal interſection, according to the order of the ſigns; that is, from weſt to eaſt. And, as they are unequal, when it happens that they anſwer to equal arcs of the ecliptic, as, *e. gr.* to the twelve ſigns of the zodiac, it follows, that ſometimes a greater part of the equator riſes, or deſcends, with a ſign, in which caſe the ſign is ſaid to aſcend, or deſcend rightly: and ſometimes, again, a leſs part of the equator riſes, or ſets, with the ſame ſign; in which caſe, it is ſaid to aſcend and deſcend obliquely. See Ascension.

Descension, *Refraction of the*. See Refraction.

DESCENSIONAL Difference, is the difference between the right and oblique deſcenſion of the ſame ſtar, or point of the heavens, &c.

DESCENT, *diſtillation by*, in *Chemiſtry*, is a mode of diſtillation adopted in ſome inſtances, where the ſubſtance to be diſtilled is placed in a veſſel above the receiver, and heat being applied at top, the liquor drops into the receiver below, which is kept cool for that purpoſe.

Descent *into a ditch*, in *Fortification*, is a deep trench, or ſap, cut through the eſplanade, and under the covert-way; covered above with planks and hurdles, and loaded with earth againſt artificial fires. See Moat.

In wet ditches the deſcent is made even to the ſurface of the water: in dry ditches, it is carried to the bottom of the moat, where traverſes are made to lodge and ſecure the miners.

Descent, in *Genealogy* and *Heraldry*, the order, or ſucceſſion, of deſcendants in a line, or family.

We ſay, one deſcent, two deſcents, &c. A gentleman is of perfect blood who has four deſcents of gentility, both by his father's and mother's ſide, *i. e.* whoſe great grandfather, grandfather, and father, on both ſides, were all gentlemen.

Descent is alſo uſed, in *Heraldry*, to expreſs the coming down of any thing from above.

Thus, a lion en deſcent is a lion with his head towards one of the baſe points, and his heels towards one of the corners of the chief; as if he were leaping from ſome high place.

Descent, Discent, or *Hereditary Succeſſion*, in *Law*, denotes the title whereby a man on the death of his anceſtor acquires his eſtate by right of repreſentation, as his heir at law; or it is the order, or manner, wherein lands and tenements are derived to any man from his anceſtors: and this is by cuſtom, ſtatute, or common law. By cuſtom, as in gavelkind or borough Engliſh; by ſtatute, as in fee-tail; and by common law, when a perſon has lands of inheritance in fee-ſimple, and dies without diſpoſing them: in which caſe the land deſcends in courſe to the eldeſt ſon and heir. The heir is, therefore, he upon whom the law caſts the eſtate immediately on the death of the anceſtor; and an eſtate, ſo deſcending to the heir, is in law called the inheritance. See Heir and Inheritance.

Thus, to make his deſcent from his anceſtors, is to ſhew how, and by what particular degrees, the land in queſtion came to a perſon from his anceſtors. See Consanguinity.

Deſcent, in common law, is either lineal, or collateral.

Descent, *Lineal*, is that conveyed down, in a right line, from the grandfather to the father, and from the father to the ſon, from the ſon to the grandſon, &c.

Descent, *Collateral*, is that ſpringing out of the ſide of the line, or blood; as from a man to his brother, nephew, or the like.

Judge Blackſtone has collected and illuſtrated the following rules or canons of inheritance, according to which eſtates are tranſmitted from the anceſtor to the heir. "Inheritances ſhall lineally deſcend to the iſſue of the perſon who laſt died actually ſeiſed *in infinitum;* but ſhall never lineally aſcend." The affirmative part of this rule has been almoſt univerſally adopted by all nations: but the negative part, whereby parents and all lineal anceſtors are excluded from ſucceeding to the inheritance of their offspring, is peculiar to our laws, and thoſe of the ſame original: for, by the Jewiſh law, on failure of iſſue the father ſucceeded to the ſon, in excluſion of brethren, unleſs one of them married the widow, and raiſed up ſeed to his brother. And, by the laws of Rome, the children or lineal deſcendants were firſt preferred; and, on failure of theſe, the father and mother, or lineal aſcendants, ſucceeded together with the brethren and ſiſters; though by the law of the Twelve Tables, the mother was originally excluded, on account of her ſex. This rule was introduced into our law at the ſame time with, and in conſequence of, the feodal tenures: and though the right of ſucceſſion in the aſcending line was reſtored by Henry I. it was ſoon diſuſed; for it was laid down as an eſtabliſhed law in Glanvil's time, under Henry II. that *hereditas nunquam aſcendit;* and this maxim has been invariable ever ſince. Another rule of inheritance is, "that the male iſſue ſhall be admitted before the female." This preference of males to females is entirely agreeable to the law of ſucceſſion among the Jews, and alſo among the ſtates of Greece, or at leaſt among the Athenians; but was totally unknown to the laws of Rome, now extant, which allow brethren and ſiſters to ſucceed to equal portions of the inheritance. It was derived to us from the feodal law, and admitted on the principle, that no female could ſucceed to a proper feud, becauſe they were incapable of military ſervice. However, according to our law, though daughters are excluded by ſons, they ſucceed before any collateral re-

lations. A third rule of defcent is, "that where there are two or more males in equal degree, the eldeft only fhall inherit; but the females all together." The right of primogeniture in males feems anciently only to have obtained among the Jews, in whofe conftitution the eldeft fon had a double portion of the inheritance. The Greeks, Romans, Britons, Saxons, and even originally the feudifts, divided the lands equally; but when the emperors began to create honorary feuds, or titles of nobility, it was found neceffary to make them impartible, or *feuda individua*, and defcendible to the eldeft fon alone: in confequence of which, the eldeft male began univerfally to fucceed to the whole of the lands in all military tenures; and in this condition the feodal conftitution was eftablifhed in England by William the Conqueror. The fourth rule of defcent is, "that the lineal defcendants, *in infinitum*, of any perfon deceafed, fhall reprefent their anceftor, or ftand in the fame place as the perfon himfelf would have done, had he been living." Thus the child, grand-child, or great-grand-child, male or female, of the eldeft fon fucceeds before the younger fon, and fo *in infinitum;* and thefe reprefentatives fhall take neither more nor lefs, but juft fo much as their principals would have done. As, if there be two fifters, Margaret and Charlotte, and Margaret dies, leaving fix daughters; and then John Stiles the father of the two fifters dies, without other iffue: thefe fix daughters fhall take among them exactly the fame as their mother Margaret would have done, had fhe been living; that is, a moiety of the lands of John Stiles in coparcenary; fo that, upon partition made, if the land be divided into 12 parts, thereof Charlotte the furviving fifter fhall have fix, and her fix nieces, the daughters of Margaret, one a-piece. This is called fucceffion *in ftirpes*, according to the roots; fince all the branches inherit the fame fhare that their root, whom they reprefent, would have done. The Jewifh fucceffion was directed in the fame manner; but the Roman fomewhat differed from it. This rule was indifputably fettled in the time of king Henry III. and has continued ever fince. A fifth rule is, "that, on failure of lineal defcendants, or iffue, of the perfon laft feifed, the inheritance fhall defcend to his collateral relations, being of the blood of the firft purchafer; fubject to the preceding rules." This rule was entirely unknown among the Jews, Greeks, and Romans; but the law of Normandy is the fame with our's in this refpect; both being derived from the fame feodal origin.

Accordingly, when an eftate hath really defcended in a courfe of inheritance to the perfon laft feifed, the ftrict rule of the feodal law is obferved; and none are admitted, but the heirs of thofe through whom the inheritance hath paffed; for all others have demonftrably none of the blood of the firft purchafer in them, and therefore fhall never fucceed. As, if lands come to John Stiles by defcent from his mother Lucy Baker, no relation of his father (as fuch) fhall ever be his heir of thefe lands; and, *vice verfâ*, if they defcended from his father Geoffrey Stiles, no relation of his mother (as fuch) fhall ever be admitted thereto; for his father's kindred have none of his mother's blood, nor have his mother's relations any fhare of his father's blood. And fo, if the eftate defcended from his father's father, George Stiles, the relations of his father's mother, Cecilia Kempe, fhall for the fame reafon never be admitted, but only thofe of his father's father. This is alfo the rule of the French law, which is derived from the fame feodal fountain. So far, it is obferved, as the feud is really antiquum, the law traces it back, and will not fuffer any to inherit but the blood of thofe anceftors, from whom the feud was conveyed to the late proprietor. But when, through length of time, it can trace it no further; or if it be not known whether his grandfather, George Stiles, inherited it from his father, Walter Stiles, or his mother, Chriftian Smith, or if it appear that his grandfather was the firft grantee, and fo took it (by the general law) as a feud of indefinite antiquity; in either of thefe cafes the law admits the defcendants of any anceftor of George Stiles, either paternal or maternal, to be in their due order the heirs to John Stiles of this eftate; becaufe in the firft cafe it is really uncertain, and in the fecond cafe it is fuppofed to be uncertain, whether the grandfather derived his title from the part of his father or his mother. This then is the great and general principle, upon which the law of collateral inheritances depends; that, upon failure of iffue in the laft proprietor, the eftate fhall defcend to the blood of the firft purchafer; or, that it fhall refult back to the heirs of the body of that anceftor, from whom it either really has, or is fuppofed by fiction of law to have originally defcended: according to the rule laid down in the Year-books, Fitzherbert, Brook and Hale, "that he who would have been heir to the father of the deceafed" (and, of courfe, to the mother, or any other real or fuppofed purchafing anceftor) "fhall alfo be heir to the fon;" a maxim, that will hold univerfally, except in the cafe of a brother or fifter of the half-blood, which exception depends upon very fpecial grounds.

The fixth rule is, "that the collateral heir of the perfon laft feifed muft be his next collateral kinfman, of the whole blood." The proximity of the collateral kinfman is reckoned according to the canonical degrees of *confanguinity*, which fee. Confequently, the brother being in the firft degree, he and his defcendants fhall exclude the uncle and his iffue, who is only in the fecond. And herein confifts the true reafon of the different methods of computing the degrees of confanguinity, in the civil law on the one hand, and in the canon and common laws on the other. The civil law regards confanguinity principally with refpect to fucceffion, and therein very naturally confiders only the perfon deceafed, to whom the relation is claimed: it therefore counts the degrees of kindred according to the number of perfons through whom the claim muft be derived from him; and makes not only his great nephew but alfo his firft coufin to be both related to him in the fourth degree; becaufe there are three perfons between him and each of them. The canon law regards confanguinity principally with a view to prevent inceftuous marriages, between thofe who have a large portion of the fame blood running in their refpective veins; and therefore looks up to the author of that blood, or the common anceftor, reckoning the degrees from him; fo that the great nephew is related in the third canonical degree to the perfon propofed, and the firft coufin in the fecond; the former being diftant three degrees from the common anceftor (the father of the *propofitus)* and therefore deriving only one-fourth of his blood from the fame fountain; the latter, and alfo the *propofitus* himfelf, being each of them diftant only two degrees from the common anceftor (the grandfather of each) and therefore having one-half of each of thefe bloods the fame. The common law regards confanguinity principally with refpect to defcents; and having therein the fame object in view as the civil, it may feem as if it ought to proceed according to the civil computation. But as it alfo refpects the purchafing anceftor, from whom the eftate was derived, it therein refembles the canon law, and therefore counts its degrees in the fame manner. Indeed the defignation of perfon, in feeking for the next of kin, will come to exactly the fame end (though the degrees will be differently numbered) whichever method of computation we fuppofe the law

law of England to ufe; fince the right of reprefentation, of the parent by the iffue, is allowed to prevail *in infinitum*. The iffue or defcendants, therefore, of John Stiles's brother are all of them in the firft degree of kindred with refpect to inheritances, thofe of his uncle in the fecond, and thofe of his great uncle in the third; as their refpective anceftors, if living, would have been; and are feverally called to the fucceffion in right of fuch their reprefentative proximity.

The former part of the prefent rule, therefore, amounts to this; that on failure of iffue of the perfon laft feifed, the inheritance fhall defcend to the other fubfifting iffue of his next immediate anceftor. Thus, if John Stiles dies without iffue, his eftate fhall defcend to Francis his brother, or his reprefentatives; he being lineally defcended from Geoffrey Stiles, John's next immediate anceftor, or father. On failure of brethren, or fifters, and their iffue, it fhall defcend to the uncle of John Stiles, the lineal defcendant of his grandfather, George, and fo on *in infinitum*. In the Jewifh law, which in this refpect entirely correfponds with ours, (Numb. c. 27.) the father, or other lineal anceftor is himfelf faid to be the heir, though long fince dead, as being reprefented by the perfons of his iffue, who are held to fucceed not in their own rights, as brethren, uncles, &c. but in right of reprefentation, as the offspring of the father, grandfather, &c. of the deceafed. But though the common anceftor be thus the root of the inheritance, yet with us it is not neceffary to *name* him in making out the pedigree or defcent. For the defcent between two brothers is held to be an *immediate* defcent; and therefore title may be made by one brother or his reprefentatives *to* or *through* another, without mentioning their common father. But, fecondly, the heir need not be the neareft kinfman abfolutely, but only *fub modo*: that is, he muft be the neareft kinfman of the *whole* blood; for, if there be a much nearer kinfman of the *half* blood, a diftant kinfman of the whole blood fhall be admitted, and the other entirely excluded; nay, the eftate fhall efcheat to the lord, fooner than the half blood fhall inherit. See Blood, *whole and half*.

The rule, together with its illuftration, amounts to this: that in order to keep the eftate of John Stiles as nearly as poffible in the line of his purchafing anceftor, it muft defcend to the iffue of the neareft couple of anceftors that have left defcendants behind them; becaufe the defcendants of one anceftor only are not fo likely to be in the line of that purchafing anceftor, as thofe who are defcended from both. But, as in the 2d, 3d, 4th, and every fuperior degree every man has many couples of anceftors, increafing according to the diftances in a geometrical progreffion upwards, the defcendants of all which refpective couples are (reprefentatively) related to him in the fame degree, a difficulty occurs in determining to which of thefe anceftors we muft firft refort, in order to find out defcendants to be preferably called to the inheritance. Another qualification, therefore, is requifite, befides the *proximity*, and *entirety*, which is that of *dignity* or *worthinefs*, of blood. Accordingly, the feventh and laft rule of defcent is, "that in collateral inheritances the male ftocks fhall be preferred to the female; that is, kindred derived from the blood of the male anceftors, however remote, fhall be admitted before thofe from the blood of the female, however near; unlefs where the lands have, in fact, defcended from a female." This is warranted by the examples of the Hebrew, Athenian, and Roman laws; and alfo of the cuftomary law of Normandy. See farther on this fubject Blackft. Com. vol. ii. chap. 14, paffim.

If one dies feifed of land, wherein another has a right to enter, and it defcends to his heir; fuch defcent fhall take away the other's right of entry, and put him to his action for recovery thereof. Stat. 32 Hen. VIII. c. 31. Co. Litt. 237.

Descent *of the Crown*. See *Right of* Crown *and* King.

Descent, *fall*, in *Mechanics*, &c. is the motion, or tendency, of a body towards the centre of the earth, either directly or obliquely: and this defcent may be confidered as occurring in a free or unrefifting medium, or as impeded by fome folid body, or as retarded by a denfe medium. We may therefore obferve, 1. That if a body b defcend freely, and in a perpendicular direction, by the force of gravity, the motive force, urging it downwards, will be equal to its whole weight, and its quantity of matter being alfo b, the accelerative force will be $\frac{b}{b}$ or 1.

2. If, whilft the body b is defcending, it is made to defcend obliquely along an inclined plane, the fine of whofe angle of inclination to the horizon is s, the radius being 1, the motive force urging the body down the plane will be bs, and therefore the accelerative force will be $\frac{bs}{b}$ or s, lefs than that in the former cafe in the proportion of s to 1.

3. A body cannot defcend in a denfe or refifting medium, unlefs it can divide and feparate the medium; which it cannot do, unlefs it be fpecifically heavier than the medium. For fince bodies cannot penetrate each other, one muft give way before the other can move: and again, though a medium, *e. gr.* water, be divifible, yet if it be fpecifically heavier than another, *e. gr.* wood, it is only heavier as it contains more particles of matter in the fame bulk, all which have an impulfe downwards; and, confequently, in water there is a greater impulfe than in the fame bulk of wood.

4. The defcending body lofes as much of its weight as is the weight of the medium, with the force of its cohefion, and the oppofing force of the particles againft which it impinges, which laft produces a greater or lefs refiftance, according to the velocity of the motion. And, therefore, a body fpecifically heavier defcends in a fluid medium fpecifically lighter (*e. gr.* the air) with a force equal to the excefs of the weight of the body above an equal bulk of the medium: for a body only defcends in a medium with the force remaining, after a part has been fpent in overcoming the refiftance of the medium; and this refiftance is equal to the weight of an equal bulk of the medium; confequently, the body only falls with the excefs of its weight above that of an equal bulk of the medium. In this cafe, the weight of the body being b, and that of an equal bulk of the medium being m, the motive force urging the body to defcend will be only $b - m$.

Hence, the power that fuftains a body in a fpecifically lighter medium, is equal to the excefs of the abfolute weight of the body above an equal bulk of the medium. Thus $47\frac{1}{3}$ pounds of copper in water lofe $5\frac{1}{3}$ of their weight. A power, therefore, of 42 pounds is able to fuftain them.

5. If two bodies have the fame fpecific gravity, the lefs the bulk of the defcending body is, the more of its gravity does it lofe, and the flower does it defcend, in the fame medium. For, though the proportion of the fpecific gravity of the body to that of the fluid be ftill the fame in a greater or leffer bulk, yet the lefs the body, the greater is the furface, in proportion to the mafs; and the larger the furface, the greater is the refiftance of the parts of the fluid.

6. If the fpecific gravities of two bodies be different, that which has the greateft fpecific gravity will defcend with greater velocity in the air or other refifting medium, than the

the other. Thus a ball of lead defcends fwifter than wood or cork, becaufe it lofes lefs of its weight, though in vacuo they both fall with equal velocity.

The caufe of this defcent, or tendency downwards, has been greatly controverted. There are two oppofite hypothefes advanced; the one holding it to proceed from an internal, and the other from an external principle: the firft maintained by the PERIPATETICS and EPICUREANS, and by the NEWTONIANS; and the latter by the CARTESIANS and GASSENDISTS. See ACCELERATION.

Laws of the DESCENT *of Bodies.* 1. Heavy bodies, in an unrefifting medium, fall with an uniformly accelerated motion. See the *laws of uniformly accelerated motion*, under the articles ACCELERATION and MOTION. 2. The fpace defcribed by a body, urged by an uniform gravity, is fubduple of that which it would defcribe in the fame time by the velocity laft acquired and uniformly continued.

Galileo, who firft difcovered the *law of the defcent* of heavy bodies by reafoning, afterwards confirmed the fame by experiments, the refult of which, repeated often both by him and fince his time, by Grimaldi, Riccioli, Huygens, Newton, and many others, was, 3. That the fpaces of defcent were as the fquares of the times, or the fquares of the velocities. See ACCELERATION.

Dr. Defaguliers tried the effect of falling bodies by caufing a leaden ball to fall from the inner cupola of St. Paul's church, whofe altitude from the ground is 272 feet. Through this fpace the ball defcended in $4\frac{1}{2}$ feconds; during which time it fhould, according to the theory, have defcended through 325.6 feet, making a difference of about one-fifth of the actual defcent between the experiment and the theory. This difference he fhews to have arifen principally from the refiftance of the air. To remedy the defects of thefe and fimilar experiments, Mr. Atwood contrived his apparatus, for an account of which, fee MOTION.

Grimaldi and Riccioli made experiments to the fame effect, though in a different manner, by letting fall a number of balls, weighing eight ounces a-piece, from the tops of feveral towers, and meafuring the times of falling by a pendulum. Ricciol. Almag. Nov. tom. i. lib. ii. cap. 21. prop. 4. Thefe experiments are exhibited in the following table.

Vibrations of the Pendulum.	Time.	Space at the end of the Time.	Space defcended each Time.
	″ ‴	Rom. Foot.	Rom. Foot.
5	0 50	10	10
10	1 40	40	30
15	2 30	90	50
20	3 20	160	70
25	4 10	250	90
6	1 0	15	15
12	2 0	60	45
18	3 0	135	75
24	4 0	240	105

By fuch and fimilar experiments the fpace defcended by a heavy body, in a given time, has been afcertained; and hence have been deduced theorems for eftimating the times, velocities, and alfo the fpaces defcended, as far as they depend on an uniform force of gravity. From many accurate experiments made in England, it has been found that a heavy body falling freely, defcends through $16\frac{1}{12}$ feet, in the firft fecond of time; and therefore the velocity gained at the end of one fecond is $32\frac{1}{6}$ feet *per* fecond. Hence we may infer that the velocity gained in any other time t is $32\frac{1}{6}\,t$, and that the fpace defcended is $16\frac{1}{12}\,t^2$.

Let v denote the velocity, and s the fpace correfponding to the time t, and put $g = 16\frac{1}{12}$; then we fhall have

$$v = 2gt = 2\sqrt{gs} = \frac{2s}{t}.$$

$$s = gt^2 = \frac{v^2}{4g} = \tfrac{1}{2}tv.$$

$$t = \frac{v}{2g} = \sqrt{\frac{s}{g}} = \frac{2s}{v}.$$

See ACCELERATION.

The fpace defcribed by a defcending body in a fecond of time has been alfo afcertained by experiments with pendulums. In the latitude of London the length of a pendulum vibrating feconds is $39\frac{1}{8}$ inches; and fince the circumference of a circle is to its diameter as the time of one vibration of any pendulum is to the time in which a heavy body will fall through half the length of the pendulum, we fhall have $3.1416 : 1 :: 1 : \frac{1}{3.1416}$, which is the time of defcending through $19\frac{9}{16}$ inches, or half the length of the pendulum; and, fpaces being as the fquares of the times, $\left(\frac{1}{3.1416}\right)^2 : 1^2 :: 19\frac{9}{16} : 193$ inches, or 16 feet 1 inch, which is the fpace through which a heavy body will defcend in one fecond, as before. See PENDULUM.

4. The time wherein a body falls from a given height being given, to determine the fpaces it fell in the feveral parts of that time.

Suppofe the given altitude $= a$, the time $= t$, and the fpace it fell in one part of time x: then

$$1 : x = t^2 : a$$

$$t^2 x = a$$

$$x = \frac{a}{t^2}.$$

Therefore the fpace paffed over in the firft part of time is $\frac{a}{t^2}$: confequently that paffed over in the fecond time $= \frac{3a}{t^2}$; that in the third $= \frac{5a}{t^2}$, &c. See ACCELERATION, *art.* 3.

5. The time wherein a body falls through a given fpace being given; to determine the time wherein it will fall through any other given fpace, in the fame medium.

Since the fpaces are as the fquare of the times, to the fpace which the body falls in the given time, the fpace in the queftion, and the fquare of the given time, find a fourth proportional, which will be the fquare of the time fought. The fquare root, therefore, being extracted therefrom, the problem is folved.

6. The fpace a body falls in a given time being given; to determine the fpace through which it will fall in any other given time.

To the fquare of the time wherein the body falls through the given fpace, the fquare of the time wherein it fhould fall through the fpace required, and the given fpace, feek a fourth proportional; this will be the fpace required.

7. For any other conftant force, inftead of the perpendicular free defcent by gravity, find the fpace defcended in one fecond by a body urged by that force, and fubftitute that inftead of $16\frac{1}{12}$ for the value of g in the preceding formulæ: or, if the proportion of this force to that of gravity be known, let the value of g be altered in the fame proportion, and the

fame

fame formulæ will hold good. Thus alfo, if the defcent be on an inclined plane, making, *e. g.* an angle of 30° with the horizon; then, the force of defcent upon the plane being always as the fine of the angle it makes with the horizon; it will, in the prefent cafe, be as the fine of 30°, that is, half the radius; and therefore in this cafe the value of g will be but half the former, $8\frac{1}{12}$, in the preceding formulæ. The fame adaptation may be applied to any conftant forces whatever.

8. The time of the oblique defcent down any chord of a circle is equal to the perpendicular defcent through the diameter of the circle.

9. The defcents or vibrations through all arcs of the fame cycloid, whether great or fmall, are equal.

10. The defcents, or vibrations, through unequal arcs of circles are unequal; the times being greater in the greater arcs, and lefs in the lefs.

For the Laws of the Descent *of bodies on inclined planes*, fee *Inclined* Plane.

For the Laws of Descent *in cycloids*, fee Cycloid, and Pendulum.

For the Laws of Descent *by variable forces*, fee Forces.

Descent, *Line of fwifteft*, is that which a body, falling by the action of gravity, defcribes in the fhorteft time from one given point to another; which is proved by geometricians to be the *cycloid;* which fee.

Descent *of the Uterus*, in *Midwifery*, fee *Bearing down of the* Uterus, &c.

DESCHEL, in *Geography*, a town of Brabant; 13 miles S. of Herentals.

DESCHKIN, a town of Ruffia, in the government of Orel; 24 miles N. of Orel, and 484 S.S.E. of Peterfburg.

DESCHNAY, a town of Bohemia, in the circle of Koniginggratz; 21 miles E.N.E. of Koniginggratz.

DESCHNO, a town of Bohemia, in the circle of Boleflaw; 4 miles W. of Aycha.

DESCRIBENT, is a term in *Geometry*, expreffing fome line or furface, which by its motion produces a plane figure, or a folid.

DESCRIPTON, in *Logic*, an imperfect, or inaccurate definition of a thing, giving a fort of knowledge thereof from fome accidents and circumftances peculiar to it, which determine it enough to give an idea that may diftinguifh it from other things; but without explaining its nature or effence.

Grammarians content themfelves with defcriptions: philofophers require definitions of things. See Definition. A defcription is an enumeration of divers attributes of a thing, moft of which are only accidental: as, when a perfon is defcribed by his deeds, his fayings, his writings, his honours, &c. A defcription, as to its outward appearance, refembles a definition, and is even convertible with the thing defcribed; but does not explain it. For, inftead of bringing feveral things effential to the thing defcribed, it only brings a number of accidents belonging to it. A defcription, therefore, is no proper anfwer to the queftion, *quid eft*, what is he? but to that, *quis eft*, who is he?

Defcriptions, in effect, are principally ufed for fingulars, or individuals; for things of the fame fpecies do not differ in effence, but only as to *hic* and *ille*, which difference contains nothing very notable, or diftinguifhable. But individuals of the fame kind differ much in accidents; *e. gr.* George is a king, and William a citizen; Charles is a male, and Anne a female; Henry is wife, and John a blockhead, &c. Thus, a defcription is an accumulation of accidents, whereby things are notably diftinguifhed from each other, though they fcarce differ at all in effence.

Some authors call a defcription a quafi-definition, as, body is a thing divifible, moveable, folid, extended, &c., which only falls fhort of a definition in this, that, inftead of the form or effence of a thing, it gives one or more properties arifing from the form or effence.

Description, in *Geometry*. To defcribe a circle, ellipfis, parabola, &c., is to conftruct or form thofe figures, with rules, compaffes, &c.

Description, in *Law*. In deeds and grants there muft be a certain defcription of the lands granted, of the places where they lie, and of the perfons to whom granted, &c., in order to make them good. But wills are more favoured than grants as to thefe defcriptions; and a wrong defcription of the perfon will not make a demife void, if there be likewife a fufficient certainty what perfon was intended by the teftator. (1 Nelf. Abr. 64.)

Description, in *Poetry and Rhetoric*, is a figure which, by the aid of imagery and argument, exhibits fuch a ftrong and lively reprefentation of a fubject, as gives a diftinct view and fatisfactory notion of it to the reader or hearer; and whilft it convinces the mind, it moves and fways the paffions. This figure is principally ufed by poets, not only with a defign to move the paffions, but to pleafe the fancy. Hiftorians alfo defcribe things, places, and perfons; and orators produce the greateft effect by defcription. In what a beautiful light has Cicero (Pro Arch. c. 7.) exhibited the polite arts and fciences when he defcribes their effects, and reprefents the benefit and pleafure which they afford to the mind! "Other ftudies neither fuit with all times, nor all ages, nor all places, but thefe improve youth, delight old age, adorn profperity, afford a refuge and folace in adverfity; pleafe at home, are no hinderance abroad, fleep, travel, and retire with us." Quintilian (Inft. Orat. l. viii. c. 3.) has painted, by defcription, the calamities of a city taken by ftorm, in the brighteft and ftrongeft colours: "Flames fpreading themfelves over the houfes and temples, the cracking of falling buildings, and a confufed noife from a variety of cries and fhouts; fome running they knew not where, others in the laft embraces of their friends, the fhrieks of children, women, and old men unhappily referved to fuch diftrefs; the plundering of all places civil and facred, the hurry and confufion in carrying off the booty, captives driven before their victors, mothers endeavouring to guard their infants, and quarrels among the conquerors, where the plunder is largeft." Juftin alfo (lib. xxix. c. 3.) gives us a fine inftance of defcription, in a fpeech of king Philip V. of Macedon, in which he reprefents the neceffity of falling upon the Romans, who at that time were engaged in a war with Hannibal. "I behold," fays he, "a cloud of a moft dreadful and bloody war rifing in Italy. I fee a ftorm of thunder and lightning from the weft, which will overfpread all places with a vaft fhower of blood, into whatever country the tempeft of victory fhall drive it. Greece has undergone many violent fhocks in the Perfian, Gallic, and Macedonian wars; but thefe would all be found unworthy of regard, if the armies now engaged in Italy fhould march out of that country. I view the terrible and cruel wars, which involve thefe nations through the courage of their forces, and fkill of their generals. This rage and fury cannot ceafe by the deftruction of one party, without the ruin of their neighbours. Indeed Macedon has lefs reafon to dread the favage conquerors than Greece; becaufe more prepared, and better able to defend itfelf; but I am fenfible thofe who attack each other fo impetuoufly will not confine their victories within thofe bounds; and that it will be our lot to engage the conquerors."

Although defcriptive poetry does not denote any one particular fpecies or form of compofition, and defcription is generally introduced as an embellifhment rather than made the fubject of a regular

a regular work; it neverthelefs enters into every fpecies of poetical compofition, paftoral, lyric, didactic, epic and dramatic, and in each of them poffeffes a very confiderable place. Defcription, fays Dr. Blair, (Lect. vol. iii. p. 158.) is the great teft of a poet's imagination; and always diftinguifhes an original from a fecond-rate genius. A true poet makes us imagine that we fee the object which he defcribes before our eyes; he catches the diftinguifhing features; he gives it the colours of life and reality; he places it in fuch a light that a painter could copy after him. This happy talent is chiefly owing to a ftrong imagination, which firft receives a lively impreffion of the object; and then, by employing a proper felection of circumftances in defcribing it, tranfmits that impreffion in its full force to the imagination of others. In this felection of circumftances lies the great art of picturefque defcription. In the firft place they ought not to be vulgar, and common ones, fuch as are apt to pafs by without remark; but as much as poffible, new and original, which may catch the fancy and draw attention. In the next place, they ought to be fuch as particularize the object defcribed, and mark it ftrongly. No defcription that refts in generals can be good; for we can conceive nothing clearly in the abftract. In the third place, all the circumftances employed ought to be uniform; that is, when defcribing a great object, every circumftance brought into view fhould tend to aggrandize; or, when defcribing a gay and pleafant one, fhould tend to beautify, that by this means, the impreffion may reft upon the imagination complete and entire; and laftly, the circumftances in defcription fhould be expreffed with concifenefs, and with fimplicity; for when either too much exaggerated, or too long dwelt upon and extended, they never fail to enfeeble the impreffion that is defigned to be made. Of all defcriptive compofitions, the largeft and fulleft, fays Dr. Blair, with which he is acquainted, is Mr. Thomfon's Seafons; a work that poffeffes very uncommon merit. Thomfon is a ftrong and a beautiful defcriber; for he had a feeling heart and a warm imagination. From him we might felect feveral inftances of moft beautiful defcription; as, the fhower in fpring, the morning in fummer, and the man perifhing in fnow in winter. In a paffage of another kind we perceive the power which a fingle well-chofen circumftance has in heightening a defcription. In his Summer, relating the effects of heat in the torrid zone, he is led to take notice of the peftilence that deftroyed the Englifh fleet at Carthagena, under admiral Vernon; when he has the following lines:

" ———— You, gallant Vernon, faw
The miferable fcene; you pitying faw
To infant weaknefs funk the warrior's arm;
Saw the deep racking pang; the ghaftly form;
The lip pale quiv'ring; and the beamlefs eye
No more with ardour bright; you heard the groans
Of agonizing fhips from fhore to fhore:
Heard nightly plunged, amid the fullen waves,
The frequent corfe.——" l. 1050.

Mr. Parnell's tale of the Hermit is confpicuous throughout the whole of it, for beautiful defcriptive narration. But of all the Englifh poems in the defcriptive ftyle, the richeft and moft remarkable are Milton's Allegro and Penferofo. The collection of gay images on the one hand, and of melancholy ideas on the other, exhibited in thefe two fmall, but inimitably fine poems, are as exquifite as can be conceived. The following paffage is felected by Dr. Blair from the Penferofo;

" ———— I walk unfeen
On the dry, fmooth-fhaven green,
To behold the wandering moon,
Riding near her higheft noon,
Like one that had been led aftray
Through the heaven's wide pathlefs way,
And oft, as if her head fhe bow'd,
Stooping through a fleecy cloud,
Oft, on a plat of rifing ground,
I hear the far-off curfew found,
Over fome wide watered fhore,
Swinging flow with folemn roar:
Or, if the air will not permit,
Some ftill removed place will fit,
Where glowing embers through the room
Teach light to counterfeit a gloom:
Far from all refort of mirth,
Save the cricket on the hearth,
Or the bellman's drowfy charm,
To blifs the doors from nightly harm:
Or let my lamp, at midnight hour,
Be feen in fome high lonely tower,
Where I may outwatch the Bear
With thrice great Hermes, or unfphere
The fpirit of Plato to unfold
What worlds, or what vaft regions hold
Th' immortal mind, that hath forfook
Her manfion in this flefhly nook:
And of thofe dæmons that are found
In fire, air, flood, or under-ground."

Here are, as he obferves, no unmeaning general expreffions; all is particular, all is picturefque; nothing forced or exaggerated; but a fimple ftyle, and a collection of ftrong expreffive images, which are all of one clafs, and recal a number of fimilar ideas of the melancholy kind; particularly the walk by moonlight; the found of the curfew-bell heard diftant; the dying embers in the chamber; the bellman's call; and the lamp feen at midnight, in the high lonely tower. The poet's manner is alfo admirably concife; and this manner, in defcribing folemn or great objects, is almoft always proper. It farther deferves attention, that in defcribing inanimate natural objects, the poet, in order to enliven his defcription, ought always to mix living beings with them. It is a great beauty in Milton's Allegro, that it is all alive, and full of perfons. Every thing in defcription fhould be as marked and particular as poffible, in order to imprint on the mind a diftinct and complete image. Moft of the ancient writers were apprized of the advantage which this circumftance gives to defcription. Thus, in the beautiful paftoral compofition, the Song of Solomon, the images are commonly particularized by the objects to which they allude. (See ch iv. 8.) Both Homer and Virgil were remarkable for the talent of poetical defcription. All Homer's battles, Virgil's defcription of the burning and facking of Troy, in the fecond Æneid, and Milton's account both of paradife, and of the infernal regions, furnifh many inftances of poetical defcription.

Much of the beauty of defcriptive poetry depends on a right choice of epithets. In this cafe every epithet fhould either add a new idea to the word which it qualifies, or at leaft ferve to raife and heighten its known fignification. So in Milton:

" —— Who fhall tempt with wand'ring feet
The dark, unbottom'd, infinite abyfs,
And through the palpable obfcure, find out
His uncouth way? or fpread his airy flight,
Upborn with indefatigable wings,
Over the vaft abrupt?" b. ii.

Sometimes it is in the power of a poet of genius, by one well-chofen epithet, to accomplifh a defcription, and by means of a fingle word, to paint a whole fcene to the fancy. The following lines of Milton's Lycidas manifeft this effect of an epithet:

> " Where were ye, nymphs, when the remorfelefs deep
> Clof'd o'er the head of your lov'd Lycidas?
> For neither were ye playing on the fteep,
> Where your old bards, the famous Druids, lie,
> Nor on the fhaggy top of Mona high,
> Nor yet where Deva fpreads her wizard ftream."

Horace and Virgil have alfo occafionally employed epithets with great beauty and propriety.

Upon the whole, the defcriptive talents of an author may be reafonably diftrufted, when we find him laborious and turgid, amaffing common-place epithets, and general expreffions, to work up a high conception of fome object, of which, after all, we can form but an indiftinct idea. The beft defcribers are fimple and concife; they fet before us fuch features of an object, as, on the firft view, ftrike and warm the fancy; they give us ideas which a ftatuary or a painter could lay hold of, and work after them; which is one of the ftrongeft and moft decifive trials of the real merit of Defcription.

The defcription of a perfon is called a character.

For the difference between defcription and imitation; fee Imitation.

DESEADA. See La Desirade.

Deseada, *Cape*, the fouthern point of the ftraits of Magellan in S. America, at the entrance of the South fea. S. lat 53°. W. long. 74° 40′.

DESEADEN, a town of Perfia, in the province of Segeftan; 30 miles S. S. E. of Kin.

DESENIK, a town of Hungary; 10 miles S. of Levens.

DESENZANO, or Dissenzano, a town of Italy, in the Breffan; celebrated for its wines; 15 miles E. of Brefcia.

DESERT, or Desart, a wild, uncultivated, uninhabited place or country: as the deferts of Libya, of the Thebaid, &c. Geographers ufe the word in the general for all countries little, or not at all, inhabited. In Scripture, we find feveral places in the Holy Land, or places adjoining thereto, called deferts, which were not abfolutely barren or unfruitful, but fuch as were rarely fown or cultivated; and though they yielded no crops of corn or fruit, they neverthelefs afforded herbage for the graziers of cattle, with fountains or rills of water, though more fparingly interfperfed than in other places. The wildernefs or defert, which was the fcene of our Saviour's temptation, with feveral others mentioned in Scripture, was of this nature and quality. Many of thefe deferts contained cities and villages, rich and well peopled; and, indeed, almoft every city had fome defert according to the Scripture idiom, belonging to it for pafture: fo that the word meant no more than a land, or tract, that bore neither corn, wine, nor oil, but was left to the fpontaneous production of nature. Reland (Paleft. l. i. p. 375.) hath fully fhewn that the Hebrew word מדבר *midbar*, which the Greeks rendered ἔρημος, and the Latins *defertum* and *folitudo*, bear no analogy to each other; and that the former was appropriated to the feeding of flocks, whilft the cultivated lands were ftyled plains and vallies, and thofe that excelled in fertility, were diftinguifhed by fome proper epithets, or even names of that import. The Scripture fpeaks of the beauty of the defert. Pf. lxiv. 13. Jer. ix. 10. Joel. i. 20.

The defert or wildernefs, abfolutely fo called, is that part of Arabia on the fouth of the Holy Land, wherein the Ifraelites wandered, from the time of their evacuating Egypt to their entry into the Promifed Land. The defert of Beerfheba was that part of the defert juft mentioned, which bordered on the Holy Land, running towards the Mediterranean. The defert of Idumæa is Idumæa itfelf, a barren mountainous country. The defert of Shur lay north of the Red fea; in this wildernefs Hagar wandered; and Ifrael came hither after having paffed the Red fea. The defert of Paran was fituated in Arabia Petræa, near the city of Paran; and here was the habitation of Ifhmael (Gen. xxi. 11.) There were two deferts of Sin; one written with a *famech* סין. (Exod. xvi. 1.) which lay between Elim and mount Sinai, and another written with a *tzade*, צין, (Exod. xix. 2.) near Kadefh-Barnea. The defert of Sinai was adjacent to mount Sinaï. The defert of Arnon was fo called from the brook Arnon which ran through the land of Gilead, on the frontiers of Arabia Deferta. The defert of Ziph was the place of David's retreat from Saul (fee Ziph). The defert of Maon (1 Kings, xxiii. 24.) lay in Arabia Petræa, at the extremity of Judah. The defert of Kadefh was fituate above Kadefh-Barnea, in the fouth of Judah, and in Arabia Petræa. The defert of Palmyra lay between the Euphrates and the rivers Orontes and Chryforrhoas. The defert of Egypt (Ezek. xx. 36.) feems to denote the defert in which the Hebrews fojourned after quitting Egypt. The defert of Judæa or Judah was the fcene of the preaching of John the Baptift (Matt. iii. 1.) This contained no lefs than fix cities, befides villages; *viz.* Bethabarah, Middin, Secanah, Nibfhan, the city of Salt, and that of Engedi. The deferts of Tekoah, Bezer, Bozrah, or Bofor, Gibeon or Gibea, Horeb, Moab, and others of lefs note, were denominated from the cities to which they belonged; and were fo many dry, uncultivated, and in general mountainous places like our downs, &c. where there are few or no habitations or inhabitants; whence the Hebrews call them by antiphrafis מדבר, which properly fignifies human word, or fpeech, becaufe there is none heard there.

One of the moft ftriking features of Africa is its immenfe deferts, which pervade many parts of that continent, and may poffibly comprize one half of its whole extent. The chief of thefe is that called "the Defert," *Sahara* or *Zaara*; which fee. The fandy deferts of Arabia have in every period of time prefented to the view of the obferver and to the arrangements of the geographers objects, highly worthy of attention. From Oman to Mecca, the greater part of Neged is one prodigious defert, interrupted towards the frontiers of Hejaz and Yemen by Kerjé, containing the diftrict of Surfa, and fome fertile fpots and towns, indicated by Niebuhr. The N. W. part of Neged prefents almoft a continued defert, a prolongation of the other, with an oafis, and on the W. of Lachfa, including Jabrin, and fome other places, mentioned by that author. In this defert there are alfo the oafis of mount Schamer; and probably feveral others. Perfia is divided by its mountains and deferts, for an account of which, fee Persia.

Desert *Iflands*, in *Geography*, a denomination given to a number of African iflands, that lie E. of Madagafcar, and from the 5th to the 40th degree of latitude; which it is needlefs to enumerate, as neither their names nor fituation are perfectly afcertained.

Desert *Ifland*, *Mount*, an American ifland, which lies on the coaft of the diftrict of Maine, Maffachufetts, containing about 200 families, and divided into two different fettlements, about 15 miles apart.

DESERTER, in *Military Language*, a perfon of whatever rank, whether commiffioned, or non-commiffioned, who having entered into the fervice of his country, by land or by fea, abfents himfelf from his poft without permiffion, and neglects to perform the feveral duties of his fituation. It is, however,

 neceffary

neceſſary that the party ſhould have received pay, or ſome allowance in money, raiment, accoutrements, or proviſions. The fact muſt alſo be decidedly proved by ſome overt act; ſuch as abſconding, going over to the enemy, ſecreting when duty, however trivial, required the party's preſence, with the known intention to quit the ſervice clandeſtinely. But if a ſoldier be abſent for many days, or weeks, through illneſs; or if he be intoxicated, or confined for debt, ſo that he could not attend at quarters, ſuch phyſical inabilities would exempt him from the imputation of deſertion; though in caſe of inebriety he would receive the puniſhment incurred by that treſpaſs.

Officers who deſert are, in almoſt every ſervice, executed: ſuch ſeverity is undoubtedly very proper, on account of the ill effects inſeparable from the bad example of ſuperiors. The Britiſh army and navy however can happily boaſt an exemption from this crime; which we could wiſh were equally unknown among the ſubordinate ranks, wherein it is, indeed, too commonly practiſed.

Our military code inflicts "death, or ſuch other puniſhment as may be adjudged by a general court-martial," on deſerters; whereby a proper diſcretionary power is left for the exerciſe of lenity in ſuch caſes as may appear leſs heinous, or where circumſtances may be favourable to the accuſed; although the crime might have been ſubſtantiated. Thus we certainly ſhou'd make a wide diſtinction between the ſoldier, who, in conſequence of bribery, or of diſcontent, either went over to the enemy, or urged others to do ſo, or who carried away his horſe, arms, &c.; and the irreſolute individual who being emaciated by ſickneſs, hunger, fatigue, or being under the influence of a large family, quitted his colours, without any adverſe intention. Repetition of the crime, and the nefarious practice of receiving bounties in ſeveral different regiments, or ſhips, aſſuredly cannot find any honeſt advocate.

Such is the deteſtation in which deſerters are held in every part of the world, that we invariably find them ſentenced to death. Even the uncivilized nations of America and Africa conform to this principle; and, probably annexing the ſtain of treachery to the treſpaſs, not unfrequently conſign all the family of the deſerter, with himſelf, to the flames!

Not only the officers, ſoldiers, &c. ſerving in regiments of the line, and other regular bodies, are ſubject to puniſhment when they abſent themſelves from their colours, but all perſons who are allowed, or are called upon by goverment, to embody, or to bear arms in the ſervice of the ſtate, are equally amenable to the military code; and, whatever their rank, or ſituation in private life, to all the penalties incurred by inattention to, or diſobedience of, martial law.

However expedient the moſt ſtrict regulations may be in time of actual war, yet in times of profound peace, a little relaxation of military rigor would not, one ſhould hope, ſays judge Blackſtone, be productive of much inconvenience. Upon this principle, though by our ſtanding laws (ſtat. 18 Hen. VI. c. 19. 2 and 3 Edw. VI. c. 2.), ſtill remaining in force, though not attended to, deſertion in time of war is made felony, without benefit of clergy, and the offence is triable by a jury and before juſtices at the common law; yet by our militia laws, a much lighter puniſhment is inflicted for deſertion in time of peace. So, by the Roman law alſo, deſertion in time of war was puniſhed with death, but more mildly in time of tranquillity. But our mutiny act makes no ſuch diſtinction; for deſertion, &c. is puniſhable with death itſelf, if a court-martial ſhall think proper. See Court Martial and Mutiny Act.

For the manner of puniſhing deſerters among the ancients, ſee Transfuga.

DE'SERTINES, in *Geography*, a ſmall town of France, in the department of Mayenne; 15 miles north-weſt of the town of Mayenne.

DESESPOIR, or Despair, *Cape*, a cape of America, on the northern ſide of Chaleur bay, about three leagues weſt-ſouth-weſt of Bonaventure iſland. Here is a large cod-fiſhery.

DESHABILLE, compounded of the privative *de*, and *s'habiller*, to *dreſs one's ſelf*, a French term, naturalized of late. It properly ſignifies a night-gown, and other neceſſaries, made uſe of in dreſſing or undreſſing.

DESHACHE', Fr. from *de* and *hacher, to cut*, in *Heraldry*, is when a beaſt has its limbs ſeparated from the body, ſo as they ſtill remain on the eſcutcheon, with only a ſmall ſeparation from their natural places.

DESICCATION, in *Chemiſtry*, is the act of reducing any ſubſtance to perfect dryneſs, and is an operation the accuracy of which is of very great importance, as the eſtimation of weights and quantities is materially affected by it. Some of the heats uſually employed by chemiſts for deſiccation may be here mentioned.

1. Very gentle heat.—Such as, for example, that of an inhabited chamber, or the open air in ſummer. Many ſubſtances are decompoſed and altered at a higher heat, and ſome of the more powerful fulminating compounds explode. The range of this heat may be taken at about from 60° to 70°.

2. Solar or moderate artificial heat.—The heat of the ſun's rays, when not concentrated by artificial means, ſeldom exceeds 120°, and is often reſorted to by chemiſts. The temperature, which would be denominated *moderate artificial heat*, may be taken at about 100° to 120°, and is often employed for drying many vegetable and decompoſable preparations. Neither fermentation nor putrefaction go on at this temperature.

3. It is often neceſſary to fix ſome maximum of deſiccation between 120° and 212° to fulfill particular purpoſes; ſuch as, for example, to avoid the coagulation of albumen, or to avoid the evaporation of any portion of the ſubſtance itſelf which is to be dried. Thus, for example, muriate of magneſia parts with a portion of its acid, as well as its water, at a heat above 180°, and the ſuccinats are partially decompoſed from the like cauſe. In ſuch caſes, therefore, the point of deſiccation ſhould be ſteadily kept up, which may often be conveniently effected by a ſlow-burning lamp, and a cloſed apparatus.

4. The heat of boiling water, or the water-bath-heat, as it is uſually termed.—This temperature is, on the whole, that which is moſt frequently uſed by chemiſts, being conveniently applied, and if properly managed, is very ſteady and uniform. The heat of boiling water itſelf is 212°, but any ſubſtance contained in a veſſel only immerſed in boiling water, or its vapour, falls ſhort of this temperature a few degrees. However, by ſaturating the water with ſalt, its boiling point is ſo much raiſed, that it is able to impart a heat of full 212° to any body immerſed in it. It is generally ſuppoſed that as water is totally evaporable, the boiling point of water affords heat enough to expel this fluid from any ſubſtance with which it may be united; but this is not correct, for all the ſalts that have any affinity with this fluid will retain a portion of it after any deſiccation at 212°, however long continued, and the more obſtinately, as appears, in proportion to the force of this affinity. So that moſt ſaline bodies, and even earths and metallic oxyds, after being dried at 212°, will loſe a little more water in a higher heat. In general it requires from half an hour to an

 hour

hour to expel from even a fmall mafs of fubftance all the water which it will part with at this heat.

5. The heat of an Argand lamp may be confidered as a convenient and tolerably uniform mean between the temperature of boiling water, and a low red heat. It may be reforted to on very many occafions with great advantage, as there are numerous faline earths and metallic fubftances that only part with water at this temperature, and none of their other conftituent parts. The deficcation produced in this way is ufually very compleat and conveniently rapid, efpecially when the fubftance is contained in a cup of platina or other metal.

Laftly, we may mention the heat of low rednefs which is juft vifible by day-light, and this is in moft cafes the utmoft heat employed for mere deficcation; though there are fome fubftances which will retain water till they have been expofed to a ftrong red-heat.

Desiccation, in *Geology*, is a term that has been ufed by geologifts to exprefs the drying or hardening of the ftrata of the earth, particularly of fuch ftrata as prefent many veins, rifts, and caverns, *e. g.* the mountain lime-ftone in Derbyfhire: whofe veins of ore prefent ftrong reafons for fuppofing them to have been formed by the fhrinking and cracking of the rock in which the mines are funk, at a period long prior to the violent heavings and rupture which the ftrata there have undergone; becaufe the inftances are numerous, of a fiffure traverfing a vein that was previoufly quite filled with fpar and ore, and the fucceffive heavings of the ftrata, noticed under our article Colliery, have ground the two furfaces into furrows, and covered them with a polifhed coating of galena, called *flickenfide*, which fee. Fiffures alfo frequently crofs and interfect the veins, and have introduced rolled pebbles and other extraneous and alluvial matters to great depths in the earth.

DESIDERATUM, from *defidero*, *I defire*, is ufed to fignify defirable improvements in any art or fcience, as yet unattained. Thus, it is a defideratum with the blackfmith, to render iron fufible, by gentle heat, and yet preferve it hard enough for ordinary ufes; with the glafs-man and looking-glafs-maker, to render glafs malleable; with the clock-maker, to bring pendulums to be ufeful where there are irregular motions; with the brafier and copperfmith, to make malleable folder; with the fhipwright, to build veffels that will fail under water; with the diver, to procure manageable inftruments for conveying frefh air to the bottom of the fea fufficient for refpiration, and the burning of lights; with the affay-mafter, to melt or copel ores, or metals, immediately without the ufe of bellows or furnace; and with the carvers and joiners, to fafhion wood in moulds like plafter of Paris, or burnt alabafter, &c. And though, as Mr. Boyle obferves, the obtaining of thefe defiderata may be thought chimerical, yet it is proper they fhould be propofed; for although perfection may not be attainable, yet approaches to it may be made, and arts thereby improved. Vide Boyle's Works abr. vol. i. p. 129, 136. In fhort, all arts and fciences have their defects, and it is not at firft to be gueffed, for how many of thefe remedies may be found, by means of chemical and philofophical refearches, properly directed.

If a proper number of perfons duly qualified for making experiments, and improving from them, would fet about each his particular fhare of the neceffary experiments, and communicate the refult of all their proceffes to one another, the bufinefs of chemical and philofophical experiments would be much better directed in regard to future ftudents, and many of the defiderata in the art probably fupplied.

DESIGN, from *defigno*, *I mark out*, the plan, or reprefentation, of the order, general diftribution, and conftruction, of a painting, poem, book, building, or the like. The painter has fhewn the firft defign of his piece, in which the figures are well difpofed. The defign of that poem, or book, is artfully laid. Claudian never fees his whole defign together; when he compofes a part he thinks of nothing elfe, and works up every member, as if it were feparate from all the reft.

In building, we ufe the term ichnography, when by defign is only meant the plan of a building, or a flat figure drawn on paper. Orthography, when fome face or fide of the building is raifed from the ground. And fcenography, when both front and fides are feen in perfpective. See each article.

Design, in *Mufic*, is the plan, fubject, *prima intentione*, of a compofition. It is not enough to produce good paffages in the melody, and to accompany them with good harmony; the whole muft arife out of, and have fome connexion with, the fubject. In all Haydn's beft productions, where his invention feems inexhauftible, the hearer is never allowed to forget the text; which, amidft all the variety and contraft of pathos, grace, fpirit, and playfulnefs of the principal melody, is heard, by means of double counterpoint, in one part or other throughout the compofition. Variety is perhaps more neceffary in mufic than in poetry or painting; but that variety fhould never amount to wildnefs, or incoherence, nor fhould the regularity degenerate into monotony and dullnefs. To fteer between thefe two extremes is the criterion by which we may eftimate the judgment, genius, and experience of the mafter. The difficulty is to affociate with the melody, movement, character, harmony, modulation, and an elegant *variety;* without which, the whole becomes unintereftıng and tirefome. The compofer, as well as the poet and painter, may, doubtlefs, dare every thing in favour of this captivating variety; provided, under the pretence of contraft, he gives us not for a well defigned work, a *Cento* of unconnected paffages of different character, which, as a whole, render the piece a monfter.

It is, therefore, in the intelligent diftribution and arrangement of the feveral parts, that a perfect *defign* confifts. In the latter productions of Mozart it is, that perfection of defign appears. The early cultivation of his talents rendered him a profound critic, at an age when others are ufually beginning their ftudies. In his firft compofition he was trying experiments, and vanquifhing difficulties; but in his maturer years he gave way to his feeling, particularly in his vocal mufic, which was little known, except at Vienna, till after his death. But in his operas, both ferious and comic, his defigns are fupported with fo much fimplicity, grace, and elegance, and fed with fuch a conftant flow of ideas, as if he had trufted to chance for arrangement.

Design, in *Architecture*, *Engraving*, *Painting*, and *Sculpture*, is chiefly ufed for the general idea, or plan of a work, including the invention, compofition, and arrangement of the whole; this being commonly fketched out, or drawn. The terms defign and drawing have become almoft fynonymous; and hence, perhaps, thefe arts have acquired the name of the arts of defign: though it may be, becaufe they are all occupied in the expreffion of forms; in the latter fenfe, defign conftitutes one of the three elements of painting, chiarofcuro and colouring being the others: this, however, is oftener called drawing, while defign is applied to the invention and compofition; fo that, technically, a picture may be well drawn, though the defign be bad, or *vice verfâ*. This diftinction feems the better founded; the term defign being ufed for a delineated invention (as the patterns in various ornamental manufactures, &c.), while

drawing oftener refers to the imitative, or executive part employed in reprefenting the appearances of objects. See Invention, Composition, Painting, and Drawing.

Design, in the *Weaving Manufactures*, fignifies the pattern of any ornamented piece of cloth, when the ornaments are woven in the loom along with the fabric. A fpecies of paper is ufed to lay down thefe ornaments to a fcale, which is called defign paper, and which ferves to direct the weaver in his fubfequent operations. In every fpecies of ornamental weaving, the whole defign is effected by the leaves of clafped twine, which move the various threads of that part of the yarn, which is ftretched in the loom, and which is called the warp. Thefe leaves are called heddles in Scotland, healds in Lancafhire, and may probably be known by other names in different parts of the country. The paper upon which the defign is to be drawn, is ruled from top to bottom with a number of parallel lines, the intervals between which reprefent certain portions of warp. Thefe, being again croffed by other parallel lines at right angles, the latter reprefent that part of the yarn which is inferted by the fhuttle, and which is called the woof or weft. The defign-paper, when ruled, has the appearance of a number of fmall fquares, and in thefe the defign is inferted with a black lead pencil, or with any kind of water colour, very frequently with vermilion, or red lake. Every interval upon the paper may be fuppofed to reprefent either one or more threads. When it will not occupy too much fpace, and when the defign requires particular delicacy of fhape, the moft accurate way is to make every interval reprefent only one thread. At other times it frequently reprefents two, and fometimes more.

The five figures in *Plate* IV., *Mifcellany*, reprefent the ufual modes of drawing defigns for the fpecies of ornamented cloth moft commonly made in Great Britain. Different ways of effecting ornaments in the loom are practifed, according to the fabric of the cloth, and the purpofe to which it is to be applied. In the lighter manufactures of the filk, lawn, and muflin trades, now chiefly ufed as ornamental parts of female drefs, the fabric is generally fo flimfy, that, when ornamented in the loom, the figures, in order to have any fhow, muft be compofed of yarn, much coarfer than that which forms the ground or fabric of the cloth, and this yarn is fometimes dyed of different colours. Being moft convenient in general, and the patterns more eafily changed, the weft, or woof, is moft frequently ufed for this purpofe. *Figures* 1 and 2, are reprefentations of this kind of work. In *fig*. 1, every fquare of the defign-paper is fuppofed to reprefent one thread both of warp and woof. In *fig*. 2, it is fuppofed to reprefent two. For the application of thefe defigns to the purpofes of mounting looms, fee the article Draught and *Cording*.

In the heavier branches of the manufacture of cloth, ornaments are effected without any alteration in the finenefs of either warp or woof, and moft frequently without any change of colour. The *figs*. 3 and 5, refer to thefe kinds of work, and the fquares in each of thefe may be fuppofed to reprefent any number of threads from three to eight, according to the finenefs of the cloth, and labour beftowed in ornamenting it. *Fig*. 4, is alfo a kind of ornamented cloth of the dimity kind of a ftout fabric. Each fquare upon the defign reprefents one thread. For the application of thefe, fee the refpective articles Diaper, Dimity, Dornock, and Draw-Loom, efpecially the laft.

When defigns are drawn upon paper, the diftance of the lines is generally fo much more than the diameters of the threads which they reprefent, that the figure upon the cloth will often be very different both in fize and appearance from the defign. To calculate this accurately is an important part of the bufinefs of a fkilful manufacturer. The rules, therefore, for this, with references to the plate, will be found in the refpective articles to which they refer.

Some general remarks upon the principle of defigning ornaments upon cloth, and upon the analogy which fubfifts between the figure of any flower or pattern, when drawn upon plain paper, when reduced to the defign-paper, and when woven into the cloth, may, however, be ufeful to thofe who poffefs an adequate knowledge of the art of manufacturing plain cloth, but who are not equally converfant with the various branches of ornamental weaving.

When an oblique or curvilineal figure is drawn or painted, either upon canvas, paper, or any other fubftance, no impediment exifts to prevent the artift from drawing every oblique ftraight line at whatever angle of obliquity he chufes, nor from forming whatever curves will add to the beauty of the picture. But, when an imitation of this is to be transferred to defign-paper, and from thence to cloth, the fame facilities do not exift, and the utmoft which the moft fkilful weaver can effect is only the neareft poffible approximation to the original from which he copies. Every perfon at all acquainted with weaving knows, that the threads of warp are ftretched in the loom, forming ftraight lines parallel to each other, and that thefe threads are interfected by the woof at right angles. No oblique pattern can, therefore, be formed in the loom, except by varying the point in the warp, where the interfection fhowing the pattern appears, and every change of this point muft be at leaft equal to the diameter of one thread. Now, if we fuppofe that there are equal quantities of warp and woof in a web, and that a fhift of one thread of warp is made, to the right or left, every time that a thread of woof is paffed acrofs, the diagonal line produced will form invariably an angle of 45° both with warp and woof. The diagonal here, then, is produced by the refolution of two equal forces, acting at right angles to each other. But an obliquity, confined invariably to an angle of 45°, would produce a very limited range of patterns indeed. *Figs*. 1 and 2, are fpecimens of fuch as may be effected by it. It becomes, therefore, neceffary, in more extenfive defigns, to vary the obliquity of the angles frequently, and this can only be done in two ways.

1ft. By fhifting the point of interfection over more than one thread of warp, which will render the angle formed by the diagonal line and warp greater, and that by the diagonal and the woof lefs than 45°, or

2d. By inferting more than one thread of woof without fhifting the point of interfection, the effect of which will be exactly the converfe of the former.

It is to be obferved, that by the diagonal line is only meant the apparent line which is prefented to the eye; for as the fhifts are at right angles, each will form either a fquare or parallelogram, the true diagonal of which is intended to be reprefented, and the means ufed are therefore only approximations to this.

When the defign (*fig*. 5.) is examined, as all the fquares forming the flower are black, whilft thofe which reprefent the ground are vacant, every fhift, when minutely infpected, is evidently at right angles, although the general effect, when viewed at fome diftance, has the appearance of diagonal or curved lines. But, were this pattern woven upon a fine cloth, the diameters of the threads would be fo much lefs than the meafures of the fquares which reprefent them upon the paper, that the angular corners which give the edges of the flower the appearance of being dented, would totally

totally difappear, unlefs very minutely infpected, and the flower upon the cloth would be much fmaller than that upon the paper.

The following table of the angles, formed between the diagonals of parallelograms, whofe fides are in the fame ratio to each other as thofe upon the defign-paper, has been calculated to affift in reducing the drawing of defigns, as nearly as poffible, to correct imitations of the drawings or paintings from which they are taken.

Table fhewing by infpection the angles of obliquity formed by colouring the fquares of defign paper for weavers, both by the warp and woof, from 1 to 9 fquares each way; the line of woof being taken as the bafe.

Squares of Warp.	Squares of Woof.								
	1	2	3	4	5	6	7	8	9
1	45°	27°	18°	14°	11°	9°	8°	7°	6°
2	63	45	34	27	22	18	16	14	13
3	72	56	45	37	31	27	23	21	18
4	76	63	53	45	39	34	30	27	24
5	79	68	59	51	45	40	36	32	29
6	81	72	63	56	50	45	41	37	34
7	82	74	67	60	54	49	45	41	38
8	83	76	69	63	58	53	49	45	42
9	84	77	72	66	61	56	52	48	45

The angles may be continued down to 1° and up to 89°, as follows: By the warp the number of fquares to be coloured for one fquare of woof will be for 85°, 11 fquares; for 86°, 14 fquares; for 87°, 19 fquares; for 88°, 29 fquares; and for 89°, 53 fquares. And reverfing the operation for the fame numbers the angles will refpectively be the complements of thofe quoted, *viz.* 11 fquares 5°; 14 fquares 4°; 19 fquares 3°; 29 fquares 2°; and 53 fquares 1°.

To underftand this table it is neceffary to obferve, that the left hand column from top to bottom contains the number of fquares, coloured upon the defign-paper, and forming the edge of the flower by the warp, or contained between one or more fpaces from top to bottom of the paper. The crofs columns at the top contain the fame by the woof, or acrofs the defign, and the figures, where the one column croffes the other, give the angle which the diagonal of a parallelogram, whofe fides are in the ratios of the two numbers to each other, would form with the bafe or crofs lines. When the number of coloured fquares each way is equal, the angle is always 45°, and in all others the angle formed by the crofs fquares is always the complement of the fame number from top to bottom. The minutes have been thrown away, being unneceffary in practice, and the neareft degree, whether a little more or lefs, taken.

When a pattern is to be reduced from a common drawing to a defign for weaving, this table may be of confiderable ufe; for if a crofs line be drawn upon the original, the angles of obliquity may be taken with very confiderable accuracy by a line of cords, or any of the ufual mathematical proceffes, and a reference to the table will fhew the number of fquares which, when coloured, will produce the effect moft nearly fimilar. Curve lines are formed merely by changing the angles of obliquity, as frequently as neceffary. When it is defirable to make a fmooth uniform line, it is always beft to fhift only one fquare at a time, and make the fhifts more frequent; for when many are fhifted, the fquare corners will be always too apparent; but where a rough edge is wanted, thefe may be reforted to.

The calculation of the fize of the flower upon the cloth, compared with that upon the paper, is merely a cafe of fimple proportion. In order to calculate correctly, the greateft number of fquares coloured from right to left, and from top to bottom, muft be counted, and the fize of the flower each way meafured; for defign-paper is ruled to many different fcales. The number of the reed, or, which is the fame thing, the number of warp-threads in a given breadth, is then to be afcertained, and alfo how many threads are reprefented by each fquare. Thefe points being fixed, the ratio of the one to the other will be readily found. A fingle example, taken from the damafk flower, (*fig.* 5.) will illuftrate this.

The fquares coloured from right to left, counting from either extremity, are 107, and the meafure is $5\frac{1}{4}$ inches.

From top to bottom the fquares are 113, and the meafure $5\frac{5}{8}$ nearly.

Let it be fuppofed that this pattern is to be wrought upon what is called a five leaf damafk, containing 2400 threads in the compafs of 37 inches. Every fquare will then reprefent five threads either way; and the threads contained in the warp of one flower will be 535.

Then as 2400 : 37 :: 535 : 8.2479, or nearly $8\frac{1}{4}$ inches. The flower, therefore, upon this fcale, will be $3\frac{1}{3}$ inches broader upon the cloth than upon the paper, and the excefs of length will be found by a fimilar proportion.

But were the fame flower to be wrought as a fpot, only two threads would be reprefented by each fquare, and the number of warp-threads would be 214 in each flower. Suppofe then the muflin to be figured, to contain 3200 threads in 37 inches, the proportion would be

As 3200 : 37 :: 214 : 2.474, or nearly $2\frac{1}{2}$ inches. In this cafe the fame flower, on the cloth, would be lefs than one-half of its breadth on the paper. The great difproportion in the fize of the two flowers depends partly upon the difference in the number of threads reprefented by one fquare, and partly by the finenefs or fet of the webs. In the firft, the ratio of decrement is *directly* as 2 to 5; in the fecond, *inverfely* as 12 to 16.

When looms are mounted to work fanciful patterns, if the range is not too extenfive, heddles are ufed, which are moved by levers or heddles attached to them below by cords, and which are preffed down by the weaver's feet. When the range of pattern becomes too extenfive to render this mounting convenient, another apparatus is adopted, which will be found in the articles Diaper, Mounting, and the moft extenfive in that of Draw-loom. The more common mountings belong to the article Draught and *Cording*.

DESIGNATION, the act of marking or indicating, and making a thing known. The defignation of fuch an eftate is made by the tenants, butments, and boundings. Among the Romans, there were defignations of the confuls and other magiftrates, fome time before their election.

DESIGNATOR, a Roman officer, who affigned and marked each perfon his place and rank in public ceremonies, fhows, proceffions, &c.

The word is formed from the verb *defignare*, to defign.

The defignator was a kind of marfhal or mafter of the ceremonies, who regulated the feats, march, order, &c. There were defignators at funeral folemnities, and at the games, theatres, and fhows, who not only affigned every one his place,

place, but alfo led him to it; as appears from the prologue to the Pœnulus of Plautus.

Much of the fame nature were the agonothetæ of the Greeks.

DESIGNING, the art of delineating, or drawing the appearance of natural objects, by lines on a plain.

To defign, according to the rules of mathematics, makes the object of perfpective.

To defign by the camera obfcura, fee CAMERA *obfcura*, and DRAWING.

DESION, in *Chronology*, the Macedonian name of the Athenian month Anthefterion. See ANTHESTERION.

DE'SIRADE, LA, in Latin *Defiderata*, in Spanifh *Defcada*, in *Geography*, one of the Caribbee ifles, or, according to the Englifh denomination, one of the Leeward iflands in the Weft Indies belonging to the French, in the neighbourhood of Antigua, fituated in N. lat. 16° 40'. W. long. 61° 20'; 18 miles N. E. of Guadaloupe, and 21 N. of Mariegalante. It is about 12 miles long and fix broad.

At what time this fmall ifland received its firft inhabitants is not known, but although it was difcovered by Columbus, it is yet a very modern colony.

In the year 1788, La Defirade contained a population of 213 white, 33 mulattoes, or free negroes, and 619 negro flaves. There is no regular town. The foil is fandy and not very fruitful; it yields fome coffee and cotton. The ifland is however of fome confequence to the French in time of war, as it gives fhelter to a number of privateers which annoy the Englifh Weft India trade.

DESIRE is defined by Mr. Locke to be the uneafinefs a man finds in himfelf upon the abfence of any thing, whofe prefent enjoyment carries with it the idea of delight; which is greater or lefs, as that uneafinefs is more or lefs vehement. The uneafinefs of defire, fixed on fome abfent good, is that, according to this writer, which determines the will, from time to time, to every voluntary action: nor does even the greater good, though apprehended and acknowledged to be fuch, determine the will, until our defire, proportionably excited, makes us uneafy in the want of it. If it be enquired, what it is that moves defire? He replies, happinefs, and that alone. This author has very properly diftinguifhed between will and defire; though many later writers have overlooked this diftinction, and have reprefented defire as a modification of the will. Defire and will agree in this, that both muft have an object, of which we have fome conception; and, therefore, both muft be accompanied with fome degree of underftanding. Neverthelefs they differ in feveral things. The object of defire may be any thing, which appetite, paffion, or affection leads us to purfue; it may be any event which we think good for us, or for thofe to whom we are well affected. I may defire meat, or drink, or eafe from pain; but to fay that I will meat, or will drink, or will eafe from pain, is not Englifh. There is, therefore, a diftinction in common language between defire and will. And the diftinction is, that what we will muft be an action, and our own action; what we defire may not be our action; it may be no action at all. With regard to our own actions, we may defire what we do not will, and will what we do not defire; nay, what we have a ftrong averfion to. Defire, therefore, even when its object is fome action of our own, is only an incitement to will, but it is not volition. The determination of the mind may be, not to do what we defire to do. But as defire is often unaccompanied by will, we are apt to overlook the diftinction between them. Reid's Effays on the Active Powers of Man, p. 63.

DESIRE, *Port*, in *Geography*, a harbour on the coaft of Patagonia, S. of cape Blanco, and about 3 leagues from Penguin ifland, having a remarkable rock, rifing from the water like a fteeple, on the fouth fide of its entrance; and this rock ferves as an excellent mark to know the harbour, which it would be otherwife difficult to find. The mouth of the harbour is very narrow, and has many rocks and fhoals about it, and a very rapid tide running at the rate of eight miles an hour. The adjoining country for feveral miles is barren and defolate, without a fingle tree or fhrub. It abounds with guanicoes, refembling our deer, but much larger, fome of them being 13 hands high, very fhy and very fwift, and an ifland within the harbour is covered with feals, many of which are larger than a bullock. Birds are alfo very plentiful.

DESISE, a town of France, in the department of the Saone and Loire, and diftrict of Autun; 15 miles E. of Autun.

DESMAISEAUX, PETER, in *Biography*, was born at Auvergne in the year 1666. He came at an early age into this country, and acquired a very accurate knowledge of its language and literature. He was elected a fellow of the Royal Society, and is known chiefly by his editions of the works of Bayle and St. Evremond. To thefe he prefixed memoirs of the authors, in which are given many curious particulars of literary hiftory and anecdote. He wrote the lives of Chillingworth and John Hales; and publifhed a collection of pieces in philofophy, hiftory, mathematics, &c. from the works of Leibnitz, Newton, Clarke, Locke, and other diftinguifhed writers. He died in London in 1745. Moreri.

DESMARETS, HENRI, one of the moft able French muficians in the reign of Louis XIV., who having married a young lady with her own confent, and that of her mother, was profecuted by her father, and condemned to death by the chatlet, and had only time to fave himfelf from an ignominious death by flight to Bruxelles, where he was appointed maeftro di cappella to Philip V. king of Spain; and after remaining 14 years in Spain, quitting that country on account of the heat of the climate injuring his wife's health, he obtained the place of fuperintendant of the mufic of the duke of Lorraine. He was obliged to remain a fugitive the chief part of his life, never having been able to obtain a pardon during the remainder of his inexorable father-in-law's days. However, in the year 1722, during the regency of the duke of Orleans, his fentence was reverfed, and his marriage declared valid. He died in 1741, at the age of 80, having compofed feven or eight operas, chiefly ferious, which were much admired in their day.

DESMARS, NICHOLAS, phyfician to the town of Boulogne, was author of feveral ufeful publications on botany, mineralogy, and medicine, publifhed about the middle of the laft century. "Obfervations d'hiftoire naturelle faites aux environs du Beauvais," 1749, treating of the air, water, plants and minerals found in the neighbourhood of the town, and of the difeafes peculiar to the place, and dependent, he thinks, on the water and foil. The work was reprinted, confiderably enlarged, in 1759, and in 1762, 12mo. "Lettre concernant quelques plantes qui naiffent en Picardie;" printed with the memoirs of the academy at Amiens, of which he was a member. He wrote alfo, in 1762, on a difeafe, then raging among the fheep; and in the following year, on a fimilar epidemic among dogs. In 1767, he publifhed a tranflation from the Greek, of the epidemics of Hippocrates, with notes and illuftrations, 12mo., which is much commended, and has manifeftly a reference to his firft work. Haller Bib. Botan.

DESMOND, in *Geography*, the name of an ancient diftrict of Ireland, which contained part of the prefent counties of Kerry

Kerry and Cork. The name implies South Munfter; and it was formerly fubject to the M'Carthys, one of whom, as king of Defmond, fwore fealty to Henry II. After the Englifh invafion, the Fitzgeralds eftablifhed themfelves there by marriage, and became powerful fupporters of the Englifh intereft in the fouth. A branch of this family (from which are alfo defcended the dukes of Leinfter, the earl of Kerry, and feveral refpectable families of commoners,) was made earl of Defmond in 1329. Far removed from the feat of government, thefe earls paid very little attention to its orders, and carried on frequent wars with the Ormond family, and other chieftains. The 16th earl was in open rebellion againft queen Elizabeth, and being taken was beheaded on the fpot, and his forfeited eftates were divided amongft Englifh undertakers. His fon died in prifon, in 1608, and the Defmond branch of the Fitzgerald family foon after became extinct. The title was given to the family of Fielding. Smith's Cork, &c.

DESMOS, in *Botany*, (δεσμος, *a chain*, alluding to the chain-like, or rather beaded, form of the feed-veffels,) a genus founded by Loureiro, Fl. Cochinch. 352. Clafs and order, *Polyandria Polygynia*. Nat. Ord. *Annonæ*, Juff.

Eff. Ch. Calyx of three leaves, flat. Petals fix, lanceolate. Berries numerous, oblong, with numerous bead-like conftrictions, each of which contains a fingle feed.

Loureiro cites feveral plants as fimilar to this genus, to which it has no affinity, nor fcarcely any refemblance; but he rightly indicates its relationfhip to *Uvaria*, *Annona*, &c. It is unqueftionably of the fame genus with *Uvaria zeylanica*, Aublet Guian. v. 1. 604. t. 243, (Funis mufæius, Rumph. Amboin. v. 5. 78. t. 42; Piper æthiopicum, Matth. Valgr. 526. Lob. Ic. v. 2. 205;) but fcarcely with Narum Panel, Hort. Malab. v. 2. 11. t. 10, which laft fhould feem to be *Uvaria zeylanica* of Linnæus. It appears probable that the above plant of Aublet, which is a tree, and the two fpecies in Loureiro, both fmall fhrubs and very nearly akin to each other, may properly belong to the genus *Unona*, Linn. Suppl. 44 & 270, the character of which would in that cafe require emendation; or rather perhaps the *Unona* itfelf, along with the plants in queftion, ought altogether to be referred to *Uvaria*. S.

DESNY, in *Geography*. See DEZNY.

DESOJA, a town of Spain, in Navarre; 10 miles S. W. of Eftella.

DESOLATION, CAPE, the S. E. point of the bay of St. Barbara, near the ftraits of Magellan or Magelhaens, fo called by captain Cook, becaufe near it commenced the moft defolate and barren country he ever faw. It is fituated in S. lat. 54° 55'. W. long. 72° 12'. About four leagues to the eaft of this cape, is a deep inlet, at the entrance of which lies a pretty large ifland, and fome others of lefs note. Nearly in this fituation fome charts place a channel leading into the ftraits of Magelhaens, under the name of ftraits of Jelouzel. The coaft is entirely compofed of rocky mountains, without the leaft appearance of vegetation. The mountains terminate in horrible precipices, whofe craggy fummits fpire up to a vaft height; fo that hardly any thing in nature can appear with a more barren and favage afpect, than the whole of this country. The inland mountains were covered with fnow; (Dec. 19, 1774) but thofe on the fea-coaft were not. The former were thought to belong to the main of Terra del Fuego, and the latter to be iflands, fo ranged, as apparently to form a coaft.

DESOLATION *Ifland*, a name given by captain Cook in his third voyage to *Kerguelen's land*, which fee.

DE SON TORT DEMESNE, in our *Law*, words of form, ufed in an action of trefpafs by way of reply to the defendant's plea. Thus, if A. fues B. in fuch an action, B. anfwers for himfelf, that he did that which it calls a trefpafs by the command of C. his mafter. A. replies that B. did it "de fon tort demefne, fans ce que C. luy commande modo et forma;" that is, B. did it of his own wrong, without C.'s commanding him in fuch manner and form.

DESPAIR, is the thought of the unattainablenefs of any good, producing in fome minds, and on fome occafions, uneafinefs or pain; on others reft and indolence.

DESPAIR, in *Geography*, a bay on the fouth-weftern fide of the ifland of Newfoundland, adjoining to Fortune bay on the north-eaftward.

DESPARS, or DE PARTIBUS, JAMES, in *Biography*, a native of Tournay, where he was born, towards the end of the fourteenth century, was in high reputation both as a divine, and as a phyfician. He was one of the canons, and treafurer to the church at Tournay. In 1414, he was fent by the univerfity at Paris, as one of the deputies to the council at Conftance. He prefented to the univerfity a filver mace, in the year 1410, and in 1455, a fecond, to be carried before the prefident; in confideration of which the univerfity inftituted a mafs, to be performed annually on the 4th of January, for the repofe of his foul. Returning from his embaffy to Conftance, he retired to Tournay, where he died, in 1465. He left many works in manufcript, feveral of which were thought fufficiently important to be printed. The principal was a tranflation and commentary on the canons of Avicenna. "Ego, Jacobus Defpars," he fays, in the preface, "de Tornaco, magifter in medicina Parifiis, expofui ad longum totum primum librum canonis Avicennæ, incipiens anno Domini, 1432, et finiens anno 1453;" fo that he employed twenty-one years on the work. The art of printing was divulged foon after the death of Defpars, and this work was printed in four volumes folio, in 1498. In 1504, his "Gloffa interlinearis in practicam Alexandri" was printed in 4to. at Lyons. Many other of his works were printed in fucceffion. They were of value in their time; but are now little noticed. For their titles, fee Eloy. Dict. Hift.

DESPORTES, JOHN BAPTIST, phyfician to the king of France, and correfpondent member of the Royal Academy of Sciences at Paris, was a native of Vitre, a town in Bretagne. After practifing fome years at Paris, he was appointed phyfician to the ifland of Domingo, where he died, after a refidence of about ten years, in 1748. He left an interefting and curious work, "Hiftoire des Maladies de Saint Domingue," which was printed in the year 1770, in 3 vols. 12mo. Befides an account of the difeafes common in Domingo, it contains defcriptions of all the plants which the author found in the ifland. In this he has corrected feveral errors in the accounts left by Plumier, and Barrere, and has added, where he could obtain them, the names by which they were known by the native Caribbees; alfo a pharmacopœia, giving the qualities, or virtues, of the plants. Eloy. Dict. Hift.

DESPORTES, FRANCIS, an eminent painter, was born at the village of Champigneul, in Champagne, in the year 1661; and being a difciple of Nicafins Bernard, imitated his manner of painting. The fubjects which he felected were flowers, infects, animals, and reprefentations of the chace, and thefe he defigned and coloured with much truth; his local colours being very good, and the aerial perfpective well managed. He was chiefly employed in the fervice of Lewis XIV.; and accompanied the French embaffador, the duke d'Aumont, to London, where he was much encouraged. He died in 1743. Pilkington.

DESPOT, a title or quality given to the princes of Walachia,

Wallachia, Servia, and some of the neighbouring countries.

The word, in its first origin, signified the same with the Latin herus, and the English master: but, in time, it underwent the same fate on medals, as, among the Latins, Cæsar did with regard to Augustus; ΒΑΣΙΛΕΥΣ answering to Augustus, and ΔΕΣΠΟΤΗΣ, *despotes*, to Cæsar. See Cæsar.

Thus, Nicephorus, having ordered his son Stauracius to be crowned, the son, out of respect, would only take the name ΔΕΣΠΟΤΗΣ, leaving to his father that of ΒΑΣΙΛΕΥΣ. For it is to be noted, that it was just about the time that the emperors began to cease to use Latin inscriptions.

This delicacy, however, did not last long; for the following emperors preferred the quality of ΔΕΣΠΟΤΗΣ, to that of ΒΑΣΙΛΕΥΣ, particularly Constantine, Michael Ducas, Nicephorus Botoniates, Romanus Diogenes, the Comneni, and some others.

In imitation of the princes, the princesses likewise assumed the title of ΔΕΣΠΟΙΝΑ.

It was the emperor Alexius, surnamed the Angel, that created the dignity of despot, and made it the first after that of emperor, above that of Augustus, or Sebastocrator, and Cæsar. See August.

The despots were usually the emperors' sons, or sons in-law, and their colleagues, or copartners in the empire, as well as their presumptive heirs. The despots, that were sons of the emperors, had more privileges and authority than those that were only sons in-law. Codin. p. 38. describes the habit and ornaments of the despot. See the notes of father Goar on that author.

Under the successors of Constantine the Great, the title despot of Sparta was given to the emperor's son, or brother, who had the city of Sparta, or Lacedæmon, by way of apanage.

DESPOTISM, or Despotic *Government*, a form of government wherein the prince is absolute and arbitrary, doing whatever he lists, without being checked by any other power. Such are most of the eastern governments; as those of the mogul, grand seignior, sophi of Persia, &c.

From the nature of a despotic power, it follows, that the single person invested with this power, commits the execution of it also to a single person. The creation of a vizir, says Montesquieu, is a fundamental law of this government: and, accordingly, the Eastern kings are never without vizirs. As virtue is necessary in a republic, in a monarchy honour, so fear is necessary in a despotic government: as to virtue, there is no occasion for it; and honour would be extremely dangerous. Persons setting a value upon themselves would be likely to create revolutions; and, therefore, fear must depress all their spirits, and extinguish every spark of ambition. As a despotic prince can have no notion of true glory, war is carried on under such a government in its full natural fury, and a less extent is given to the law of nations, than in other states. As fear is the principle of despotic government, its end, besides the pleasures of the prince, is tranquillity; a tranquillity, however, that cannot be called a peace; it is merely the silence of those towns which the enemy is ready to invade. As the strength does not lie in the state, but in the army that founded it; in order to defend the state, the army must be preserved, how formidable soever to the prince. In despotic states, religion, or rather superstition, has greater influence than any where else; it is a fear added to fear; and, therefore, it is not unaptly observed by Gibbon, that despotism originates in superstition; or it may be truly said to derive its chief support from it, in connection with the military power which it commands. In Mahometan countries, it is partly from their religion that the people derive the surprising veneration which they have for their prince. Of all despotic governments, there is none that labours more under its own weight than that wherein the prince declares himself the proprietor of all the lands and heir to all his subjects. Hence arises the neglect of agriculture; and if the prince intermeddles likewise in trade, all manner of industry is ruined. Under this sort of government nothing is repaired or improved. In despotic governments, where the prince's brothers are equally his slaves and rivals, prudence requires that their persons be secured; especially in Mahometan countries, where religion considers victory or success as a divine decision in their favour; so that they have no such thing as a monarch *de jure*, but only *de facto*. The princes of despotic states have always prevented the use of marriage. They generally take many wives, especially in that part of the world where absolute power is in some measure naturalized, *viz*. Asia. Hence, they have such a multitude of children, that they can hardly have any great affection for them, nor the children for one another. The reigning family resembles the state; it is too weak in itself, and its head too powerful; it seems very numerous and powerful, and yet is suddenly extinct. Poverty, and uncertainty of property, in a despotic state, render usury natural; each person raising the value of his money in proportion to the danger he sees in lending it. Misery, therefore, pours in from all parts into those unhappy countries: they are bereft of every thing, even of the resource of borrowing. Hence it is, that a merchant under this government is incapable of carrying on a great trade; for, if he were to encumber himself with a large quantity of merchandise, he would loose more by the exorbitant interest he must give for money, than he could possibly get by his goods. A government cannot be unjust, without having hands to exercise its injustice. The embezzling of the public money is, therefore, natural in despotic states. As this is a common crime under this government confiscations are very useful. In this kind of government, authority must ever be wavering; nor is that of the lowest magistrate less steady than that of the despotic prince. As the prince's will is the law, it is necessary that those who will for him should follow his subitaneous manner of willing. In despotic governments, of course, there are no laws; the judge is himself his own rule; and in these governments the prince himself may be judge. The principle of despotic government is subject to a continual corruption, because it is in its very nature corrupt. Other governments are destroyed by particular accidents which do violence to the principles of each constitution: this is ruined by its own intrinsic imperfection, when no accidental causes impede or corrupt the principles on which it is founded. It maintains itself, therefore, only when circumstances drawn from the climate, religion, situation, or genius of the people, oblige it to follow some order, and to admit of some rule. By these things its nature is forced without being changed: its ferocity remains; and it is made tame and tractable only for a time. From the nature, properties, and effects of a despotic government, one might imagine that it would meet with a general and perpetual opposition. But, notwithstanding the love of liberty, so natural to mankind, notwithstanding their innate detestation of force and violence, most nations, says Montesquieu, are subject to this very government. This, he says, is easily accounted for. In order to form a moderate government, it is necessary to combine the several powers, to rule, temper, and set them in motion, to give, as it were, ballast to one, in order to enable it to resist another.

This is a mafter-piece of legiflation, rarely produced by hazard, and feldom attained by prudence. On the contrary, a defpotic government offers itfelf, as it were, at firft fight; it is uniform throughout; and as paffions only are requifite to eftablifh it, this is what every capacity may reach.

As republics provide for their fecurity by uniting, defpotic governments do it by feparating, and by keeping themfelves, as it were, fingle. They facrifice part of the country, ravage and defolate the frontiers; and by thefe means render the heart of the empire inacceffible. It preferves itfelf, likewife, by another kind of feparation; which is, by putting the moft diftant provinces into the hands of a feudatory prince. The mogul, the king of Perfia, and the emperors of China, have their feudatories; and the Turks have found their account in putting the Tartars, the Moldavians, the Wallachians, and, formerly, the Tranfylvanians, between themfelves and their enemies.

DESFOUILLE, Fr. in *Heraldry*, is the whole cafe, fkin, or flough, of a beaft, with the head, feet, tail, and all appurtenances, fo that, being filled, or ftuffed, it looks like the entire creature.

DESPREAUX, in *Biography*. See BOILEAU.

DESPUMATION, of *de*, *priv.* and *fpuma*, *froth*, the clarification of any liquor, by throwing up its foulnefs in a froth, and taking that off.

DESQUAMATION, from *de*, and *fquamo*, *I fcale*, expreffes the flaking or fcaling of carious bones. See EXFOLIATION.

DESS, in *Agriculture*, a term applied to any fquare portion of cut fodder; thus, a defs of hay fignifies a cut of hay, &c.

DESS-*up*, fignifies to pile up any fort of cattle fodder, &c. in a neat manner.

DESSAU, in Latin *Deffavia*, in *Geography*, a confiderable town of Germany, in the principality of Anhalt Deffau, in the circle of Upper Saxony, and refidence of the prince of Anhalt Deffau, whofe dominions, fince the peace of Tilfit, are in the confcription of the new kingdom of Weftphalia. Deffau is fituated in a delightful plain on the river Mulde, which, at a fmall diftance from the town, runs into the Elbe. The palace is a fine building; the ftreets of the new part of the town are fpacious and elegant. There are two Calvinift churches and one Lutheran, a grammar-fchool, feveral charitable foundations, and fome manufactures of woollen cloth, ftockings, and hats. But Deffau has more particularly acquired fome celebrity within the laft 30 years, from two inftitutions eftablifhed here, one for the education of boys of good family, on principles nearly allied to thofe fuggefted by J. J. Rouffeau. This inftitution, known by the name of *Philantropinum*, owed its origin to the celebrated Bafedow, (fee BASEDOW,) who, for feveral years, conducted it with the greateft fuccefs, and whofe elementary writings opened the career in which Campe, Villaume, Saltzmann, and other German literati, have fo eminently diftinguifhed themfelves. The fecond inftitution, equally favourable to the diffufion of knowledge, was a printing prefs and library, for the printing and publifhing of works on account of their authors, without the interference of a bookfeller; the beneficial confequence of which was, that the German publifhers offered better prices for the manufcript writings of men of known celebrity, and that young authors might feel the pulfe of the public tafte, by publifhing their productions on their own account. Both thefe eftablifhments were warmly patronized by the prince, who is ftill at the head of the principality of Anhalt Deffau.

Near Deffau are two fummer palaces, Louifium and Wörlitz, which fee.

DESSENIUS, BERNARD, in *Biography*, born at Amfterdam in 1510, was fent firft to Louvain, where he foon diftinguifhed himfelf by his acquirements in claffical literature. Declaring at length for the practice of medicine, he went to Bologna, in Italy, and, in 1538, he took his degree of doctor in that faculty. A vacancy happening foon after at Groningen, he accepted the office of profeffor, in the practice of medicine, which he taught with reputation for nine years. From thence, invited by Echtius, profeffor in medicine there, he went to Cologne, where he approved himfelf fo well, as to be admitted member of the college of phyficians, and to receive a confiderable penfion from the government. This he retained to the time of his death, which happened in 1574. He was author of feveral ufeful works. His "De Compofitione Medicamentorum," fol. 1555, contains many valuable obfervations, and improvements on the formulæ, ufed in his time. "De pefte, Commentarius, præfervatio, et curatio," Col. 1564, 4to. He fpeaks of a leathern jacket, which had paffed into the hands of 25 perfons, who had received the infection from it, and been deftroyed, before the caufe was difcovered. He wrote alfo in defence of the ancient medicine, and againft the practice introduced by Paracelfus. Haller. Bib. Med. Pract.

DESSERT, or DESART, Fr. the laft fervice brought on the tables of people of quality, when the meats are all taken off. The deffert confifts of fruits, paftry-works, confections, &c.

DESSICATIVE, or DESICCATIVE, from *deficco*, *I dry up*, in *Medicine*, a remedy that has the virtue of drying up fuperfluous moifture; ufed to fkin over old fores, &c. We fay, a deficcative unguent, &c.

Pimpinella is held deterfive, deficcative, and vulnerary. Lemery.

DESSOUBRE, in *Geography*, a river of France, which runs into the Doubs, at St. Hypolite.

DESTAKTUL, DE, a Tartarian village of Siberia; 48 miles S.W. of Yakutfk.

DESTILLATION, or DISTILLATION, in *Chemiftry*. See DISTILLATION.

DESTINIES, in *Mythology*. See PARCÆ.

DESTINY, from *deftino*, *I order*, the order, difpofition, or chain of fecond caufes appointed by Providence; and importing, or carrying with it, a neceffity of event.

According to many of the heathen philofophers, deftiny was a fecret and invifible power, or virtue, which, with incomprehenfible wifdom, conducted what to us appears irregular and fortuitous. This amounts to what we call God.

The Stoics, by deftiny, underftood a certain concatenation of things, which from all eternity follow each other of abfolute neceffity, there being no power able to interrupt their connexion. This anfwers, in a great degree, to the ideas entertained by fome of Providence.

But the Stoics made even the gods themfelves fubject to the neceffity of this deftiny. The truth is, the Stoics rather define what the word deftiny fhould fignify, than what it did fignify in common language; for they had no diftinct idea of this power, to which they attributed thofe events. They had only a vague, confufed idea of fome kind of chimera, or unknown caufe, to which they referred that invariable difpofition, and eternal concatenation of all things. There is no real being to which the fame deftiny can agree. The heathen philofophers, who had framed a notion thereof, fuppofed it to exift, without knowing precifely what they meant by it. But men, not daring on the one fide to impute to Providence the evils and misfortunes that befel them, as they imagined, undefervedly; and on the other fide, not being

ing willing to allow that it was their own fault, formed this phantom of destiny, to bear the weight of all the evil.

DESTOUCHES, Philip Nericault, in *Biography*, was born at Tours in the year 1680. He was sent early to Paris to study the law, but the consequences of a love affair in which he engaged at sixteen made it necessary for him to leave that situation; and having no resources, he entered as a private soldier into a regiment then under orders for Spain. At the siege of Barcelona he narrowly escaped with his life. Shortly after this, he entered into a provincial company of players, with whom he visited Switzerland, became the poet of the party, and composed a comedy which was acted with great applause in that country, and afterwards in France. While he was at Soleure, he attracted the attention of the marquis de Puysieux, the French ambassador, who made him his private secretary, and obtained for him a respectable rank in life. On his return to Paris, he brought out with great success several comedies: by these he was raised to a high rank among the writers of the time. He was afterwards sent by the regent duke of Orleans to England as assistant to the abbé Dubois, in the negociations between the two courts. At the court of London he resided 7 years as the sole resident: here he married, but circumstances obliged him for some time to keep the matter a perfect secret. His conduct in England was highly approved, and duties of the same kind were afterwards offered him, which he declined, preferring a literary retreat to the business and bustle of a diplomatic station. At the age of sixty, he devoted himself entirely, and employed his talents in the service of religion. He died at the age of 74, and his works were collected and printed in four volumes quarto, which were afterwards published in 10 volumes 12mo. As a comic writer, he is inferior to Regnard in gaiety and humour, to Moliere, in truth and nature, and in unforced pleasantry; but by many he is thought to deserve the place next to these authors; he surpasses them in the morality and decorum of his pieces, and he had the art of attaining the pathetic without losing the *vis comica*, which is the essential character of this species of composition. In the various connections of domestic life, he maintained a truly respectable character, and in early life, he gave evidence of his filial duty, by sending 40,000 livres out of his savings to his father, who was burdened with a large family.

Destouches, Andre' Cardinal, a voluminous composer of French operas on Lulli's plan, written chiefly by La Motte: these have been long forgotten; but his voyage to Siam with the abbé de Choisis, is still remembered. He died at Paris in 1749, aged 75.

DESTRUCTION, passively taken, is the corruption or annihilation of something before existing. See Corruption.

A thing passes from *esse* to *non esse*, either by corruption, when nothing of the substance is lost, but only the accidents, *viz.* the disposition of parts; or, by annihilation, when both substance and accidents are lost.

Destruction *island*, in *Geography*, lies off the coast of New Albion, in N. lat. 47° 37'. W. long. 124° 11'. It is about a league in circumference, level, and almost entirely barrren, producing only a few dwarf trees; although the country to the southward of it exhibits an appearance of the greatest fertility.

DESUDABÆ, in *Ancient Geography*, a town of Thrace, in the country of the Mœdi, according to Livy.

DESUDATION, from *desudo*, *I sweat much*, expresses a profuse and inordinate sweating, followed by the irruption of sudamina, or heat-pimples.

DESULTOR, from *desilio*, *I vault*, in *Antiquity*, a vaulter, or leaper, who jumped off one horse upon another.

Among the Scythians, Indians, and Numidians, the cavaliers, or horsemen, who served in the wars, were very expert desultores; that is, they always carried with them at least two horses, and when that they were mounted on grew weary, or wanted breath, they leaped with great agility and address, upon the other which they led in their hand.

The Greeks and Romans borrowed the same practice from those barbarous nations; but they only used it in their games, races, and funeral solemnities; and never, that we read of, in war. The desultores, therefore, were, among the people of Asia and Africa, soldiers; but, among the Romans, &c. they were no more than tumblers and posture-masters. Eustathius, on Homer's Iliad, lib. iv. assures us, that instead of two, they had sometimes four or six horses all a-breast, and would jump from the first to the fourth or sixth, which was the master-piece of their art.

DESUNNAY, in *Geography*, a river of Wales, in the county of Merioneth, which runs into the Irish sea, five miles S.E. from Surnabugh point.

DESVRES, formerly called *Désures*, and *Désurennes* is a small town of France, chief place of a canton, in the department of the Pas de Calais, district of Boulogne, 9 miles E. of that place. It has 2109 inhabitants. The canton reckons a population of 9443 individuals, distributed in 23 communes, on a territorial extent of 195 kiliometres.

DESUVIATII, in *Ancient Geography*, a people of Gallia Narbonnensis, who occupied, according to Pliny, the vicinity of the Anatilians and Cavarians, on the banks of the Rhone. D'Anville places them N. of Arelate.

DESWARTE, in *Geography*, a river of Brabant, which runs into the Demer, near Diest.

DETACHE', *Fr.* A term in *Music* equal to *sciolto* or *staccato*, Ital. and detached, separated, accented, and cut, in English: when, instead of sustaining the notes during their whole value, they are performed as if there was a rest after each, equal to half the length of the note it follows. This short and dry manner of executing the notes is usually expressed by lengthened points, or accents, thus '''

DETACHED Pieces, in *Fortification*, are demi-lunes, ravelins, horn and crown-works, and even bastions, when separated, or at a distance from the body of the place.

In painting, the figures are said to be well detached, or loosened, when they stand free and disengaged from each other, are no where confounded together, but stand out with a strong relievo from the ground, and from each other.

DETACHMENT, as a military term, refers to the sending away a portion of any force upon any particular service. We generally consider a detachment to be rather a small portion of the whole body; viewing it as still appertaining thereto, and acting under the authority by which it was detached. Thus escorts, foraging-parties, &c. whether from one corps, or composed of drafts from several, though all of different classes, such as horse, infantry, artillery, engineers, pioneers, &c. all come under this denomination.

It is perhaps difficult to adduce any part of the military science that requires more judgment than the detachment of various parties for the necessary purposes of supply, communication, surprize, or reinforcement. When we look back into the annals of military events, there appear numberless instances of ruin occasioned by the injudicious and incautious manner of detaching small parties from the main body. Hence we cannot but coincide with the practice of the greatest generals, such as the duke of Marlborough, marshall Turenne, prince Eugene, the great Frederick, the no less admirable

admirable Waſhington, and many others, who ſeemed to avoid detachments, at leaſt ſmall ones; conſidering them, no doubt, as being eaſily cut off. Thoſe generals uſually kept their forces as much concentrated as the means of ſubſiſtence, lodging, &c permitted.

The general who ſends out numerous ſmall detachments in various directions, while in the vicinity of an enemy, ſubjects them to be cut off in detail, and to have his head-quarters attacked by any enterprizing partizan. It ſhould ever be recollected, that detachments generally are forced to ſelf-preſervation, and leave to the care of the main body ſuch others as may not be within ſight: hence, when attacked in their rear, theſe ſmall parties are ordinarily obliged to ſurrender. Nor is it adviſable, even in a friendly country, to allow too much diſperſion of a force; for when riots happen, or that orders are ſuddenly received for a new deſtination, it will be found more difficult, than common obſervers may ſuppoſe, to reſcue from danger in the former caſe, or to concentrate the whole in the latter inſtance, ſo as to move off in full force, with alacrity and due order.

In ſhort, ſmall detachments, like centinels too far removed from their poſts of relief, are open to every danger, and in the end perform very inſignificant ſervices. In many inſtances it is better to move a large army, to effect what may be conſidered comparatively trifling, rather than to ſubject a ſmall portion to the danger of being cut off.

Detachment *of a fleet or ſquadron*, a certain number of ſhips choſen by an admiral or commodore from the reſt of the fleet, and charged to execute ſome particular ſervice.

DETAINER, in *Law*. See Forcible *entry*.

DETENT, in *Horology*, is a piece of ſteel that detains or arreſts the motion of one wheel that would otherwiſe continue its motion as actuated by the maintaining power. In the ſtriking part of a clock, where a count-wheel is uſed, that bar which falls in the way of the notches in the count-wheel, and ſtops the motion of the ſtriking train when the laſt blow is made, is called the detent: but in a chronometer, that piece of metal which catches a tooth of the eſcapement-wheel, and holds it while the balance performs its oſcillation, is the detent; and may, according to the French conſtructions, turn on pivots, or otherwiſe be made elaſtic without pivots, agreeably to the Engliſh practice. Many of the clock-eſcapements alſo have detents, as may be ſeen more particularly under our article Escapement.

DETENTION, from *detineo, I detain*, in *Law*, the poſſeſſion or holding of lands, or the like, for ſome other claimant.

The word is chiefly uſed in an ill ſenſe, for an unjuſt withholding, &c.

The canons condemn a perſon who has intruded into a benefice, to make reſtitution of all the fruits thereof, during the time of his unjuſt detention.

DETERGENTS, in *Medicine* and *Surgery*, conſtitute a claſs of remedies which have been ſuppoſed to cleanſe or deterge unhealthy humours. The old theories on this ſubject are now wholly exploded; but the fact remains, that certain ſubſtances applied to morbid parts, and eſpecially to ſores, will render the ſurface more clean and healthy.

Detergents are either mechanical or chemical. Pure water is one of the beſt detergents for common wounds: but where an ulcer remains ſordid and ill-conditioned, it is often uſeful to apply a ſolution of ſome irritating ſubſtance, which produces an healthy diſcharge of pus. See the articles Abstergent and Cicatrix.

The detergents in general uſe for local applications, are turpentine, nitre, verdigris, alum, vitriolated zinc and copper, red nitrated mercury, or red precipitate, lunar cauſtic, or nitrated ſilver, &c. But, for internal uſe, phyſicians preſcribe what are called balſamic medicines, abſorbents, and vulneraries, which have been erroneouſly imagined to act as healing, ſuppurating, and cleanſing remedies, to the internal parts of the body.

DETERIORATION, an act whereby a thing is impaired or rendered worſe.

When the deterioration of a commodity, ſeized by an officer, ariſes from the fault of the keeper, he is anſwerable for the ſame.

J. Frederic Mayer, profeſſor at Leipſic, printed a treatiſe of deterioration, in the year 1695, under the title of "Tractatus de Deterioratione."

DETERMINATE Number. See Number.

Determinate *Problem*, is that which has but one, or at leaſt but a certain number of ſolutions; in contradiſtinction to an indeterminate problem, which admits of infinite ſolutions.

Such, *e. gr.* is the problem: To deſcribe an iſoſceles triangle on a given line, whoſe angles at the baſe ſhall be double that at the vertex: which has only one ſolution; as that which follows has two, *viz.* To find an iſoſceles triangle, whoſe area and perimeter are given.

A determinate problem may either be ſimple or linear, plane, ſolid, or ſurſolid.

Determinate *Ramoſus*, *Caulis*, in *Botany*, is often applied by Linnæus, in his later works, to that kind of ſtem which may be called abruptly branched, each branch, after terminating in flowers, throwing out a number of freſh ſhoots, in a circular order, juſt below the origin of thoſe flowers. This term does not occur in the Philoſophia Botanica, nor any other elementary work of the learned Swede. It is exemplified in many ſpecies of Heath, as well as in the genus *Azalea*. See Caulis.

DETERMINATION, in *Phyſics*, the diſpoſition or tendency of a body towards one way, rather than another. Heavy bodies have a determination towards the centre of the earth.

Determination is alſo uſed for the action whereby a cauſe or agent is limited, or reſtrained, to act, or not act, in this or in that manner.

Determinations, ſay the ſchoolmen, proceed either from an efficient cauſe, in which caſe the determination is called effective; as, when an artiſt determines an inſtrument to a certain action; or from the form, as that determines the indifferency of the matter: and thus our ſenſes are ſaid to be determinations to have ideas upon the preſence of external objects.

Or the determination is from the matter or ſubject that receives the action; and thus the heating of fire upon clay determines it to harden, upon wax to ſoften, &c.

Or it is from the object; as when we ſay, colour determines the viſual power: or, laſtly, it is from the end, as the end determines the deſire.

Determinations, again, are either moral or phyſical. A moral determination is that proceeding from a cauſe which operates morally, *i. e.* by commanding, perſuading, or adviſing, ſome effect. This is the only kind of influence or determination which is conſiſtent with man's free moral agency; or indeed with any agency at all.

Phyſical determination is an act whereby God excites and applies a ſecond cauſe to act, antecedently to all operation of the creature. Such a determination the Thomiſts and Dominicans maintain neceſſary to all the actions of every creature. The Jeſuits, on the contrary, deny that God thus determines even ſecond cauſes; and hold, that God exerts no influence on ſecond cauſes, but only with the ſecond cauſe on the action. And thus they exclude a phyſical determination,

termination, both from natural caufes, as fuppofing them already determined by nature to act; fo that there needs no other external determination from God to the feveral actions; and from free caufes, as fuppofing fuch a predetermination contrary to our natural liberty. See Desire, Motive, Volition, and Will.

A determination to be pleafed with certain forms, or ideas, an ingenious author calls an internal fenfe; and a determination to be pleafed with virtuous actions, characters, manners, &c. a moral fenfe. See Sense.

Determination *of Will*, in *Law*. See Estate *at Will*.

DETERMINATIVE Proposition, in *Logic*. See Complex *Propofition*.

DETERN, in *Geography*, a fmall town of Holland, in the principality of Eaft Friefland, which, till the peace of Tilfit in July 1807, belonged to the king of Pruffia. This place has lately become fafhionable on account of its mineral waters.

DETERRATION, from *de* and *terra*, is ufed to fignify a removal of the earth, fands, &c. from the mountains and higher grounds, down into the valleys and lower parts. This is occafioned by rains, which wafh the earthy matter down by degrees; but this cannot be very confiderable, or much raife the furface of the earth, as fome have imagined, becaufe a good part of it is funk into the clefts and caverns of the rocks and mountains, a great quantity is borne down into rivers, and thence into the fea, and the richer and finer parts help to compofe the bodies of plants and vegetables. From this deterration or devolution, as the difintegration of mountains is called by Woodward and others, the fecondary ftrata of the earth, according to fome theories of geology, had their origin.

DETERSIVE, in *Surgery*, the fame with *Detergent*, which fee.

DETERSOR, from *detergo*, *I clear away*, in *Antiquity*, a fervant whofe bufinefs it was to attend at dinner, and wipe the table. Pitifc.

DETERSORIUM, in *Antiquity*, a name given to the common wafh, which was bean-meal, called *lomentum*, or the meal of a fort of pulfe called *lupines*: this laft they called *fmegma*.

The ancients, when they bathed, ufed various wafhes for cleanfing the fkin; but *natrum*, and this thin froth, called in Greek *aphronitron*, were moft common.

DETHARDING, George, in *Biography*, was born at Stetin, about the middle of the 17th century. His father was an apothecary, and well verfed in chemiftry, to the knowledge of which, having initiated his fon, he fent him to Louvain, where he took his degree of doctor in medicine; he was thence invited to Stralfund, and having practifed medicine there ten years, he was in the year 1680 appointed firft phyfician to the duke of Mecklenburg. This obliged him once more to change his habitation, and to go and refide at Guftrow. He appears to have been living at Guftrow as late as the year 1696, when he publifhed his "Nomenclator Chirurgicus." Several of his communications were publifhed in the Memoirs Academ. Nat. Cur. A ftill greater number of his effays, or differtations, were publifhed by his fon after his death. The titles of a few of thefe follow; the remainder will be found in Haller's Bib. Med. and in Eloy's Dict. Hiftor.; *viz*. "De modo fubveniendi fubmerfis in Aqua, per Laryngotomiam," Roftoch, 1714, 4to. The practice has not been much followed, but in extreme cafes fhould not be omitted; the operation neither requiring much fkill in the performance, nor being attended with danger. "De Variolarum Inoculatione," 1723, 4to. He was one of the few writers on the continent, who at that early period recommended the practice. "De neceffitate infpectionis vulnerum in crimine homicidii," 1726, 4to. Eloy gives the titles of twenty different effays.

DETINET, in *Law*. See *Debet* and *Detinet*.

DETINUE, a writ which lies againft a man who, having goods, or chattels, delivered to keep, refufes to re-deliver them.

Detinue anfwers, in great meafure, to the *actio depofiti* of the civilians.

In this action of detinue it is neceffary to afcertain the thing detained, in fuch manner as that it may be fpecifically known and recovered. Therefore, it cannot be brought for money, corn, or the like; for that cannot be known from other money or corn; unlefs it be in a bag or fack, for then it may be diftinguifhably marked. In order, therefore, to ground an action of detinue, which is only for the detaining, thefe points are neceffary (Co. Litt. 286.); 1. That the defendant came lawfully into poffeffion of the goods, as either by delivery to him, or finding them; 2. That the plaintiff have a property; 3. That the goods themfelves be of fome value; and, 4. That they be afcertained in point of identity. Upon this the jury, if they find for the plaintiff, affefs the refpective values of the feveral parcels detained, and alfo damages for the detention. And the judgment is conditional, that the plaintiff recover the faid goods, or (if they cannot be had) their refpective values, and alfo the damages for detaining them (Co. Entr. 170. Cro. Jac. 681.) But there is one difadvantage which attends this action; *viz*. that the defendant is herein permitted to wage his law, that is, to exculpate himfelf by oath (Co. Litt. 295.), and thereby defeat the plaintiff of his remedy; which privilege is grounded on the confidence originally repofed in the bailee by the bailer, in the borrower by the lender, and the like; from whence arofe a ftrong prefumptive evidence, that in the plaintiff's own opinion the defendant was worthy of credit. For this reafon, the action itfelf is of late much difufed, and has given place to the action of *Trover*; which fee.

Detinue *of Charters*. A man may have detinue for deeds and charters concerning land: but if they concern the freehold, it muft be in C. B. and no other court. Action of detinue lies for charters which make the title of lands: and the heir may have a detinue of charters, although he hath not the land. If my father be diffeifed, and dieth, I fhall have detinue for the charters, notwithftanding I have not the land: but the executors fhall not have the action for them. New Nat. Br. 308.

Detinue *of goods in frank marriage*, is on a divorce betwixt a man and his wife; after which the wife fhall have this writ of detinue for the goods given with her in marriage. Mich. 35 Eliz. 1. New Nat. Br. 308.

DETMOLD, or Dethmold, anciently *Thietmal*, in *Geography*, an inconfiderable but very old town of Germany, in the county of Lippe, in the circle of Weftphalia, which is now in the confcription of the new kingdom of Weftphalia. It is fituated on the river Werre, three miles S. of Lemgow, 18 N. of Paderborn, and has a caftle, which is the ufual refidence of the counts of Lippe. The town is divided into the old and new town. It has a very excellent grammar fchool. Cluverius and others fuppofe that Detmold is actually the ancient Teutenburg, in the vicinity of which the Roman general Quintilius Varus met with a fevere defeat.

DETONATION, in *Chemiftry*, is fudden combuftion, attended with a loud and inftantaneous noife. It is fynonymous with fulmination.

DETONNER, *Fr.* in *Mufic*, to fing or play out of time, or in falfe intervals, that are equally offenfive in a fingle part, as in harmony.

DETOUR,

DETOUR, in *Geography*, in Upper Canada, the entrance into lake Huron from Muddy lake to the S. and W. of St. Jofeph's ifland.

Detour alfo lies on the N. fhore of lake Huron, a little to the E. of the ifles au Serpent.

Detour *Point* lies on the W. main, in the ftrait made by St. Jofeph's ifland.

Detour *des Anglois*, or *Englifh Turn*, is a circular direction of the river Miffiffippi, fo confiderable that veffels cannot pafs it with the fame wind that conducted them to it. The two forts and batteries at this place on both fides of the river are more than fufficient to ftop the progrefs of any veffel. Dr. Cox, of New Jerfey, afcended the Miffiffippi to this place, A. D. 1698, took poffeffion, and called the country Carolina. It lies 18 miles below New Orleans, and 87 above the Balize. The banks of the river are fettled and well cultivated from hence to New Orleans, and there is a good road for carriages all the way.

Detour, in the *Military Art*, fignifies that circuitous route taken by a body of troops, for the purpofe of evading obfervation, or of paffing round the flank of an enemy, fo as to come by furprife againft fome weak part: or to force a paffage at a point on which the general fuccefs of the day might depend.

Detours are ufually made in the night time, and require the utmoft caution. Silence fhould, as much as poffible, be obferved, and the whole equipment ought to be made in a manner fuitable to the main intention. The men fhould be felected; the ordnance, (if any be ufed,) fhould be light and well fupplied with horfes, &c.; and nothing fhould be allowed to accompany, which could, in the fmalleft degree, retard the movement, or require time for arrangement when arrived at the place of attack.

Unhappily our allies have, in almoft every inftance, allowed themfelves to be taken in flank, or even to be affaulted in their rear, by neglecting to take pofitions which rendered the accefs by detour difficult: hence we have commonly witneffed, with pain, that many advantageous movements have been rendered nugatory, indeed fatal, by the neglect of guarding againft this device: a device which we muft ever expect an enterprifing enemy will perpetually refort to, when his main body may be ftrongly pofted (if inferior,) or be capable of fhewing a fufficient front.

When two different columns, or divifions, intend to attack by detour, at any given point of the enemy's flank or rear, the utmoft precaution ought to be ufed to arrive precifely at the appointed hour, and to diftract the attention of the troops to be furprifed. Sometimes an attack is made openly by one column, while another makes a fecret detour with the view to cut off the retreat of the enemy, if he be overpowered; or to create a diverfion in cafe the conteft fhould be fevere, and doubtful. In fuch cafes much hazard is incurred by both columns; therefore the manœuvre muft be very cautioufly managed, and ought to be confided to the fuperintendance of officers diftinguifhed for their courage, difcretion, and prefence of mind.

DETRAHENS Quadratus, in *Anatomy*, a name given by fome authors, particularly Spigelius, to a mufcle, called by the generality of anatomifts the platyfma myodes; and, by Albinus, latiffimus colli. Douglas calls it alfo quadratus genæ. See Deglutition.

DETRANCHE', among the *French Heralds*, fignifies a line bendwife, which does not come from the very dexter angle, but either from fome part of the upper edge, and thence falling athwart, or diagonally; or form part of the dexter fide. They fay, *tranché*, *detranché*, and *retranché*; to denote that there are two diagonal lines, making two partitions in the efcutcheon, and coming from the angles, and a third from fome of the other parts above mentioned. See Tranche'.

DETRITUS, in *Geology*, is a term ufed for the fmall fragments and matters formed by the fuppofed difintegration of the primeval mountains of the globe, by the Mofaic and other deluges, which, according to the theories of fome, have contributed to the formation of the *ftrata*, which fee.

DETROIT, in *Geography*, a port town, the principal and the beft fortified in the country N. W. of the Ohio river. It is the chief town of the county or territory of Wayne, and is fituated on the weftern bank of the ftrait St. Clair, or Detroit river, between lake Erie and lake St. Clair; 18 miles N. of the W. end of the former, and 9 miles below the latter. Detroit contains about 300 houfes, and 1200 inhabitants: it ftands contiguous to the river, on the top of the banks, which are here about 20 feet high. At the bottom of them there are very extenfive wharfs for the accommodation of the fhipping, built of wood, fimilar to thofe in the Atlantic fea-ports. The town confifts of feveral ftreets that run parallel to the river, which are interfected by others at right angles. They are all very narrow, and not being paved, extremely dirty in wet weather; but for the accommodation of paffengers there are foot-ways in moft of them, formed of fquare logs, laid tranfverfely clofe to each other. The town is furrounded by a ftrong ftockade, through which there are four gates; two of them open to the wharfs, and the two others to the N. and S. fides of the town refpectively. The gates are defended by ftrong block-houfes, and on the W. fide of the town is a fmall fort in the form of a fquare, with baftions at the angles, and having one fide which commands the river. At each of the corners of this fort is planted a fmall field-piece: and thefe conftitute the whole of the ordnance at prefent in the place. The Britifh kept a confiderable train of artillery here, but the place was never capable of holding out for any length of time againft a regular force: the fortifications, indeed, were conftructed chiefly as a defence againft the Englifh. Detroit is at prefent the head-quarters of the weftern army of the ftates: the garrifon confifts of 300 men, who are quartered in barracks. About two-thirds of the inhabitants of Detroit are of French extraction; and the greater part of the inhabitants of the fettlements on the river, both above and below the town, are of the fame defcription. The former are moftly engaged in trade, and they all appear to be much on an equality. This is a place of very confiderable trade; there are no lefs than twelve trading veffels belonging to it, brigs, floops, and fchooners, of from 50 to 100 tons burthen each. The inland navigation in this quarter is indeed very extenfive; lake Erie, 300 miles in length, being open to veffels belonging to the port, on the one fide, and lakes Michigan and Huron, the firft upwards of 200 miles in length, and 60 in breadth, and the fecond no lefs than 1000 miles in circumference, on the oppofite fide; befides lake St. Clair and Detroit river, which connect thefe former lakes together, and many large rivers which fall into them. The ftores and fhops in the town are well furnifhed with fine cloth, linen, &c.; and its chief trade confifts in a barter of coarfe European goods with the natives for furs, deer-fkins, tallow, &c. The inhabitants are well fupplied with provifions of every defcription, and particularly fifh, of which the moft efteemed is a fort of large trout, called the "Michillimakin," or white fifh, from its being caught moftly in the ftraits of that name. The want of falt was, till of late, attended with great inconvenience: but falt fprings have been difcovered in various parts of the country, and they are now beginning to manufacture this article for

for themfelves. Some of the fprings in the weftern country throw up water fufficient to yield feveral hundred bufhels in the courfe of one week.

There is a large Roman Catholic church in the town of Detroit, and another on the oppofite fide, called the Huron church, from its having been devoted to the ufe of the Huron Indians. The ftreets of Detroit are generally crowded with Indians of one tribe or the other; and amongft them you fee numberlefs old fquaws leading about their daughters, ever ready to difpofe of them, *pro tempore*, to the higheft bidder. At night all the Indians, except fuch as get admittance into private houfes, and remain there quietly, are turned out of the town, and the gates fhut upon them. The country round Detroit is very much cleared, and fo is that on the Britifh fide of the river for a confiderable diftance above the town. The fettlements extend nearly as far as lake Huron; but beyond the river La Trenche, which falls into lake St. Clair, they are fcattered very thinly along the fhores. The banks of the river La Trenche, or Thames, as it is now called, are increafing rapidly in population, on account of the great emigration thither of the people from the neighbourhood of Niagara, and alfo of Detroit, fince it has been evacuated by the Britifh. The country round Detroit is uncommonly flat, and none of the rivers have a fall fufficient for turning even a grift-mill: their corn therefore is ground by wind-mills. The foil of the country bordering upon Detroit river is rich though light, and it produces good crops both of Indian corn and wheat. For eight miles below, and about the fame diftance above fort Detroit, on both fides of the river, the country is divided into regular and well cultivated plantations; and from the contiguity of the farmers' houfes to each other, they appear like two long extended villages. The climate is much more healthy than that of the country in the neighbourhood of Niagara river; although intermittent fevers are not uncommon diforders. The fummers are intenfely hot, Fahrenheit's thermometer often rifing above 100; and yet a winter feldom paffes over without fnow remaining on the ground for two or three months.

By the treaty of Grenville, Aug. 1795, the Indians have ceded to the United States the port of Detroit, and all the land to the N., W., and S. of it, of which the Indian title has been extinguifhed by gifts or grants to the French or Englifh governments; and fo much more land is to be annexed to Detroit as fhall be comprehended between Rofine river on the S.; lake St. Clair on the N.; and a line, the general courfe of which fhall be fix miles from the W. end of lake Erie and Detroit river. The fort was delivered up by the Britifh in July, 1796, according to treaty. It lies 18 miles N. of lake Erie, 724 N.W. by W. from Philadelphia, N. lat. 42° 40'. W. long. 82° 56'. Weld's Travels through North America, vol. ii. Morfe. See MALDEN.

DETROIT *river*, or *Strait of St. Clair*, iffues from lake St. Clair, and enters the weft end of lake Erie forming part of the boundary between the United States and Upper Canada. In afcending it, its entrance is more than three miles wide, but it is perceptibly diminifhed: fo that oppofite to the fort, 18 miles from lake Erie, it does not exceed half a mile in width; from thence to lake St. Clair it widens to more than a mile. The channel of the ftrait is gentle, and wide and deep enough for fhipping of great burthen, although it is incommoded by feveral iflands, one of which is more than feven miles in length. The foil of thefe iflands is fertile, and by their fituation prefent an agreeable appearance. The length of the river is 28 miles, and feveral ftreams fall into it, chiefly from the N.W.; *viz.* Bareche, Clora, Gueriere, Detroit, and Huron rivers. On the Detroit are feveral windmills, and an orchard adjoins to almoft every houfe. The fettlers are numerous, and the improvements extenfive. When the fruit-trees are in bloffom, the profpect as you pafs through the ftrait is as delightful, perhaps, as any in the world.

DETROIT, *le Petit*, lies on the Ottawa river, in Upper Canada, below the upper main forks of the Ottawa river.

DETROIT, in a *Military Acceptation*, relates to thofe fituations which appear to be the natural embouchures, or entrances, of areas enclofed among mountains, wilderneffes, &c. beyond which an army cannot penetrate; fuch areas being acceffible from no other quarter. Many large tracts are fo happily fituated as to be invulnerable on every fide, except at a detroit, or ftraight, where a very fhort line of defence fuffices to keep the enclofure perfectly fecure.

When an army retires to a *Cul-de-fac* (*i.e.* literally the bottom of the bag,) it may be eafily excluded from further operations in the field, by a comparatively fmall force; provided the very entrance is occupied by the detaining power. But if the detroit expands gradually towards the open country, and that there be heights which command the funnel, or entrance, it will demand a fuperior number to prevent thofe who have retreated thereto, from iffuing forth at pleafure; becaufe the batteries (or flankings) alone, would prevent the occupancy of thofe pofts that might keep the embouchure clofely guarded, and prevent the faliant column from deploying into line as the ground might admit of enlarging the front.

Nothing can be more favourable than taking poft in a cul-de-fac, whofe entrance is a detroit. When the pofition can be maintained by means of abundant ftores, both of provifion and of ammunition; and when the fituation is airy and healthy; but, on the other hand, nothing can be more hazardous, indeed, more entirely fatal, than the retreat to fuch, when either provifion, or ammunition, is likely to fall fhort. In fuch cafes a furrender muft take place; as, on two or three occafions happened to the Romans, who were compelled to lay down their arms, and to pafs under the yoke. A good general, who has confidence in his troops, will, however, do his utmoft to force the paffage of the detroit, if it be in the hands of the enemy; if it be in his own poffeffion, he will fally forth, in fo determined and pointed a manner, as may awe his oppofers, and, in all probability, obtain either a complete releafe, or honourable terms, for the gallant troops under his command. The fortifications thrown up at the place where the river St. Lawrence becomes extremely narrow at its fall into lake Erie, in Canada, were defignated Detroit, on account of the manner in which the adjacent country, as well as the river contracts, and forms a very limited debouchure from the upper country.

DETRUSOR URINÆ, in *Anatomy*, the mufcular covering of the bladder. The membranous receptacle, which receives the urine fecreted in the kidnies, is covered by a thin ftratum of mufcular fibres, which ferve the purpofe of expelling the contained fluid, when it has accumulated to a certain quantity. This mufcular covering of the urinary bladder has been defcribed as a mufcle by feveral anatomifts, who have diftinguifhed it from its office, by the name of detrufor urinæ. For a more particular account of it, fee KIDNEY, in which article the whole of the urinary organs will be confidered.

DETTELBACH, in *Geography*, a fmall town of Germany, in the grand duchy of Wurzburg, in the circle of Franconia. It is feated on the river Mayn. Its church is celebrated for a fine image of the Virgin.

DETTEZ, a town of France, in the department of the Saone and Loire, and diftrict of Autun; 8 miles W.S.W. of Montcenis.

DETTINGEN, a village of Germany, in the circle of the Lower Rhine, belonging at that time to the elector of Mentz, is famous for the victory which the allied troops of Auftria and England, led on by king George II. of Great Britain, gained in its vicinity over the French on the 16th of June 1743. It is fituated on the Mayn, in the diftrict of Seligenftadt, between that town and Afchaffenburg.

DETTOR, a river of N. Wales, which runs into the Tivy, in the county of Cardigan.

DETUNDA, in *Ancient Geography*, a town of Spain, in Bœtica, belonging to the Turduli. Ptolemy.

DEVA, a town of Arabia Felix. Ptolemy.

Deva, a river of ancient Britain, which is evidently the river Dee in Galloway, which falls into the fea at Kirkcudbright.

Deva, called alfo *Deuna*, or *Deonna*, a place in the fecond route of Antonine's Itinerary, between Condate and Bovium, in the country of the Cornavii, unqueftionably fituated where the city of Chefter now ftands; it was a place of great confideration, a Roman colony, and the head-quarters of the 20th legion. This legion came into Britain in the reign of the emperor Claudius, and was employed in the conqueft of this ifland, and in many important works and expeditions in different parts of it. Though the 20th legion continued more than two centuries in Britain, it feems to have left this country a confiderable time before the final departure of the Romans. It is moft probable that it was recalled about the end of the fourth, or beginning of the fifth century, when the continental provinces of the empire began to be much haraffed by the incurfions of barbarous nations.

Deva, in *Geography*, a fmall town of Spain, in Bifcay, in the province of Giupuzcoa. It is fituated on the river of the fame name, which forms a harbour in the bay of Bifcay, 36 miles S.E. of Bilbao, and 15 N. of Placentia. W. long. 3°. N. lat. 43° 30'.

Deva, a town of Tranfylvania; 10 miles W. of Millenbach.

DEVANA Texalorum, in *Ancient Geography*, a place of Britain, in the country of the Texali, near the eftuary of the river Diva or Dee, now Old Aberdeen.

DEVAPORATION, in *Phyfics*, is a term ufed by way of contraft to *evaporation*, which fee. As heat feems to be the principal caufe of evaporation, as well as of folution, and of fluidity in general, the privation of heat may be efteemed the principal caufe of devaporation; for, though the air may, by its own power of attraction, or by means of the electricity it may contain, diffolve and fufpend a portion of water, as water diffolves and fufpends a portion of falt; yet, by the application of cold, thefe are refpectively precipitated; and, therefore, heat may be affumed as the immediate caufe of thefe folutions. Befides, water boils *in vacuo* with lefs heat; that is, it evaporates *in vacuo*, more rapidly or more eafily than in the open air, and therefore the attractive power of the atmofphere does not feem neceffary to evaporation. When the barometer finks, whatever may be the caufe, the lower ftratum of air becomes expanded by its elafticity, being releafed from a part of the fuper-incumbent preffure, and, in confequence of its expanfion, robs the vapour which it contains of its heat; whence, that vapour becomes condenfed, and is precipitated in fhowers; as is vifible in the receiver of an air-pump. There are, however, two curious circumftances, relating to the devaporation of water. 1. That the deduction of a fmall quantity of heat from a cloud or expanfe of vapour, compared with the quantity of heat which was neceffary to raife that vapour from water, will evaporate the whole. This circumftance is evident in the operation of common fteam-engines, in which a fmall jet of water, whofe heat is often above 48 degrees, perpetually devaporates the fteam raifed by a comparatively very great quantity of heat under the boiler. This phenomenon may be thus explained; if a fmall part of the quantity of vapour be fuddenly condenfed, a vacuity takes place, and the contiguous walls of vapour expand themfelves into this vacuity; and thus a large area of vapour, perhaps of many miles in circumference, becomes more or lefs expanded; by this expanfion cold is produced, (that is, its capacity of receiving heat is increafed,) and the whole is devaporated. Something fimilar to this is often feen at the commencement of thunder-ftorms; a fmall black cloud at firft appears, in a few minutes the whole heaven is covered with condenfing vapour, and the accumulation or efcape of electric matter, feems to be rather the confequence than the caufe of this fudden and general devaporation. A fecond curious circumftance of aerial devaporation is, that when the particles of aqueous vapour begin to approach each other by the diminution of their heat, they do not generate water exactly in proportion to fuch diminution of heat; but the condenfation proceeds further, and not only a greater quantity of water is produced, but alfo a quantity of heat is fet at liberty along with this excefs of devaporation, and the atmofphere becomes warmer than before the beginning of condenfation. This excefs of devaporation beyond the cold which produced it is probably owing to the acquired momentum of the aqueous particles towards each other at the beginning of their condenfation, which carries them ftill nearer each other: and to the fmall moleculæ at firft formed, poffeffing a greater attractive power over the uncondenfed vapour in their vicinity, and thus preffing out more of the latent or combined heat. On this fubject fee Dr. Darwin's paper in Phil. Tranf. vol. lxxxviii.

DEVASTAVIT, or Devastaverunt *bona teftatoris*, a writ that lies againft executors or adminiftrators, for paying debts upon fimple contract and legacies, before debts on bonds and fpecialties, &c. for in this cafe they are as liable to action, as if they had fquandered away the goods of the deceafed, or converted them to their own ufe; and are compellable to pay fuch debts by fpecialty out of their own goods, to the value of what they fo paid illegally. (Dyer, 232.) But if an executor pays debts upon fimple contract, before he hath any notice of bonds, it is no devaftavit; and regularly this notice is by an action commenced againft him, for the law doth not oblige him to take notice of it himfelf, nor of a judgment againft his teftator; becaufe he is not privy to acts done either by or againft him. 1 Mod. 175. 1 Lev. 115.

Executors keeping the goods of the deceafed in their hands, and not paying the teftator's debts; or felling them, and not paying off debts, &c., or not obferving the law which directs them in the management thereof; or doing any thing by negligence or fraud, whereby the eftate of the deceafed is mifemployed, are guilty of a devaftavit, or wafte; and they fhall be charged for fo much *de bonis propriis*, as if for their own debt. (8 Rep. 133.) But the fraud or negligence of one executor is not chargeable on the reft, where there are feveral executors. 1 Rol. Abr. 929. See Debt and Executor.

DEVAUX, John, in *Biography*, a native of Paris, born in the year 1610, was educated to the practice of furgery, which he appears to have followed to a late period, and with reputation, as we find him invefted, for the third time, with the prefidency, or deanfhip, of the company of furgeons, at the time of his death, which happened in September 1695, when

when he was in the 85th year of his age. This account we have from his fon, alfo named John, who fucceeded to the honourable ftation, held by his father. It does not appear that the father had publifhed, or that he left any thing written on the fubject of medicine, but the deficiency was abundantly fupplied by the fon, who befides fome not inconfiderable original works, introduced to his countrymen, as editor, or tranflator, a great number of medical works, written by foreigners. Among the tranflations, are "Allen's Synopfis Medicinæ Practicæ;" "Harris de Morbis Infantum;" "Cockburne de Gonorhœa;" and "Friend's Emmenologia:" alfo "Epitomes of Anatomy," by Heifter; and "Dionis. Saviard's Chirurgical Obfervations;" "Boerhaave on the powers of Medicine;" "La Motte's Treatife of Midwifery." His original works are, "Le Medicin de foi-meme, ou l'art de fe conferver la fante, par inftinct." Leid. 1682, 12mo. Difeafes are caufed, he fays, by repletion in the veffels, and by corruption of the contents of the bowels. They are to be cured by bleeding, by emptying the bowels, and by abftinence, to prevent a re-accumulation. He cenfures the phyficians for their general want of fuccefs in practice, and fhews them that illiterate countrymen frequently effect cures they are incapable of performing. "Art de faire les rapports en Chirurgie, par M. D. Prevot de la Comp." Paris, 1727. Giving rules for detecting the caufe of death in perfons who have been ftrangulated, poifoned, &c. Both this and the former works have gone through feveral editions.

DEUBACH, in *Geography*, a village of Germany, in the duchy of Saxe-Gotha, famous for its brooms, bafkets, and hampers, with which it carries on a confiderable trade.

DEUCALEDONII, or CALEDONII, in *Ancient Geography*, a people who inhabited the northern part of the ifle of Albion; called by Ammianus Marcellinus *Dicaledones*. See CALEDONIA.

DEUCALION, a name given by Strabo to an ifland, which he places over-againft a promontory of Theffaly, in the environs of the Maliac gulf.

DEUCALION, in *Mythology*, was the fon of Prometheus, who married Pyrrha, the daughter of his uncle Epimetheus. Prometheus, it is faid, had been banifhed into Scythia, to the confines of Caucafus, during the wars of the Titan princes. His fon Deucalion, weary of this melancholy retreat, came and fettled in Theffaly, in the vicinity of Phthia, or rather, according to the Parian marbles, in Lycoria, near Parnaffus. The era of his arrival is marked in the fame chronicle, at the 9th year of the reign of Cecrops at Athens, which commenced, according to the Arundelian marbles, in the year 1582 B. C., or according to the account given by Eufebius, in the year 1556 B. C. or 780 years before the 1ft Olympiad. Deucalion, it is faid, not contenting himfelf with the petty ftates which he had feized upon, made war upon his neighbours, and made himfelf mafter of the Lower Theffaly, near the river Peneus; the name of the province at that time was Phthiotis, from Phthius of Arcadia, who had feized upon it 160 years before, according to Paufanias (in Arcad.) Moft authors are of opinion that the deluge which happened in the reign of this prince, about the year 1503 B.C., according to Eufebius's account, or, according to the marbles 26 years earlier, was occafioned by the river Peneus, whofe courfe was probably ftopped by fome earthquakes between mount Offa and Olympus, where is the mouth of that river, through which it difcharges itfelf into the fea, with the accumulation of water furnifhed by five other rivers. This overflow, as it is faid, together with a vaft quantity of rain that fell that year, laid all Theffaly, which is a low country, under water. (See Herodotus, l. i.) Some time after, the waters having retired, the country was very foon re-peopled. When the waters were affuaged, Deucalion, according to the Parian Chronicle, went to Athens, where, in gratitude to the gods for having preferved him from the general inundation of the country, he offered folemn facrifices to Jupiter, in a temple which he built to his honour, and which was ftill fubfifting in the time of Pififtratus, who, at a great expence, rebuilt it.

Some have fuppofed that Deucalion, whom the Greeks have reprefented under a variety of characters, and concerning whom their poets have given many fabulous accounts, was the fame with the patriarch Noah; and that Deucalion's flood in Theffaly, as well as that of Ogyges in Attica, and of Prometheus in Egypt, were the fame with that of Noah, recorded in Scripture. Diodorus Siculus exprefsly fays, that, in the deluge which happened in the time of Deucalion, almoft all flefh died. Apollodorus having mentioned Deucalion εν-λαρνακι, *configned to an ark*, takes notice, upon his quitting it, of his offering up an immediate facrifice, Δι-Φυξιω, *to the god who delivered him*. As he was the father of all mankind, the ancients have given him great dignity and univerfal monarchy; though fometimes he is reduced to a petty king of Theffaly. Apollonius Rhodius makes him a native of Greece, and the fon of Prometheus. We may learn, however, from their confufed hiftory, that the perfon reprefented was the firft of men, through whom religious rights were renewed, cities built, and civil policy eftablifhed in the world: none of which circumftances are applicable to any king of Greece. Philo affures us, that the Grecians call the perfon Deucalion, but the Chaldæans ftyle him Noe, in whofe time there happened the great eruption of waters. But as Lucian has given us the moft particular hiftory of the deluge, and that which comes neareft to the account given by Mofes; and as he was a native of Samofata, a city of Commagene upon the Euphrates, a part of the world where memorials of the deluge were particularly preferved, and where an obvious reference to that hiftory may be obferved in the rites and worfhip of the country, we fhall terminate this article with an extract of what he fays on the fubject.

Having defcribed Noah under the name of Deucalion, he fays, that the prefent race of mankind are different from thofe who firft exifted; for thofe of the antediluvian world were all deftroyed. The prefent world is peopled from the fons of Deucalion; having increafed to fo great a number from one perfon. In refpect to the former brood, they were men of violence, and lawlefs in their dealings. They regarded not oaths, nor obferved the rites of hofpitality, nor fhewed mercy to thofe who fued for it. On this account they were doomed to deftruction: and for this purpofe there was a mighty eruption of waters from the earth, attended with heavy fhowers from above; fo that the rivers fwelled, and the fea overflowed, till the whole earth was covered with a flood, and all flefh drowned. Deucalion alone was preferved to re-people the world. This mercy was fhewn to him on account of his juftice and piety. His prefervation was effected in this manner: he put all his family, both his fons and their wives, into a vaft ark which he had provided, and he went into it himfelf. At the fame time animals of every fpecies, boars, horfes, lions, ferpents, whatever lived upon the face of the earth, followed him by pairs; all which he received into the ark, and experienced no evil from them: for there prevailed a wonderful harmony throughout by the immediate influence of the Deity. Thus were they wafted with him, as long as the flood endured.

After this, he proceeds to mention that, upon the difappearing of the waters, Deucalion went forth from the ark, and raifed an altar to God. Diod. Sic. lib. i. p. 10. Apollod. lib. i. p. 20. Apollon. Rhod. lib. iii. v. 1085. Philo Jud. de Præmio & Pœna, vol. ii. p. 412. Lucian de Dea Syria, vol. ii. p. 882.

Dr. Bryant produces a variety of monuments, that bear an obvious reference to the deluge, in the Gentile hiftory, befides this account of Deucalion and his flood. Analyfis of Ancient Mythology, vol. ii. p. 193—250. See DELUGE.

DEVELTO, or ZAGORIA, in *Geography*, a town of European Turkey, in Bulgaria, the fee of a Greek archbifhop, near the Black fea; 59 miles N.E. of Adrianople, and 106 N.N.W. of Conftantinople. N. lat. 42° 25′. E. long. 27° 22′.

DEUELTUS, or DEUELTON, in *Ancient Geography*, a town in the interior of Thrace, towards the Euxine fea, not far to the weft of Apollonia, on the border of a lake. It became a Roman colony under Vefpafian, who fixed his veterans there; from this prince it took the name of Flavia, as it is found upon medals.

DEVENERUNT, in *Law*, a writ anciently directed to the efcheator, on the death of the heir of a tenant of the king holding *in capite*, within age, and in the king's cuftody; commanding the efcheator, to enquire, upon the oaths of good and lawful men, what lands and tenements, by the death of the tenant, come to the king (Dyer 360.) This writ is now difufed.

DEVENISH, in *Geography*, an ifland in Lough Erne, in the county of Fermanagh, Ireland, which is remarkable for fine fcenery. There are in this ifland a round tower, and the ruins of a priory, which Ledwich fuppofes to have belonged originally to the Culdees, and which afterwards under the Auguftinians acquired great poffeffions. It is a few miles from Ennifkillen. Ledwich.

DEVENTER, HENRY, in *Biography*, a celebrated accoucheur, was born at Deventer, in the province of Over-Yffel, in Holland, towards the end of the 17th century. Though fkilled in every branch of medicine, and honoured with the dignity of doctor in that faculty, he was principally employed in furgery, and in the latter part of his life he almoft entirely confined himfelf to the practice of midwifery, in which art he made confiderable improvements. He acquired alfo no fmall fhare of fame by his various mechanical inventions, for affifting in preventing and curing deformities of the body, in young fubjects. In that capacity he was repeatedly fent for to Denmark, whence he drew a confiderable revenue. His knowledge of mechanics did not, however, prevent his obferving that much mifchief was done by the too frequent ufe of inftruments in midwifery.

The greateft difficulty to the birth of the child occurred, according to his doctrine, from the uterus being placed obliquely in the pelvis. In confequence of this pofition, the pains or contractions of that vifcus forced the prefenting part of the child againft one fide of the collum uteri, inftead of preffing it immediately into its orifice. This defect he attempted to remedy, by paffing his hand into the uterus, and bringing the vertex of the head of the fœtus into the opening or mouth of the womb. When the pelvis of the woman was too ftraight, he often remedied the evil, by pufhing back the os coxygis with his hand. This, however, muft be done very delicately, or abfceffes in the part, or incurable lamenefs, may be produced. Deventer had probably met with accidents of the kind, as in the latter part of his life he admitted the neceffity of fometimes opening the head of the child, and then drawing it away with the crotchet. When an arm of the child prefented, he paffed his hand into the uterus, and brought it away by the feet, without firft twifting off the prefenting arm, as had been recommended and practifed by former writers on the fubject. He taught his pupils to diftinguifh fpurious from true labour pains, and to quiet the fpurious pains, by emptying the bowels, by glyfters and mild eccoprotics, and by giving one or more of his anodyne or opiate pills; the compofition of which he for a long time kept fecret. Thefe were ferious improvements in the art, and gave him a decided preference over Mauriceau, his almoft immediate precurfor. Satisfied with the principles on which his practice was founded, he publifhed, in 1701, "Operationes Chirurgicæ novum lumen exhibentes, obftetricantibus," Leiden, 4to. It had been before publifhed, *viz.* in 1696, in his native language. This was followed by a fecond part, in 1724, 4to., "Ulterius examen partuum difficilium, Lapis Lydius obftetricum, et de neceffaria cadaverum incifione." The two parts were publifhed together, much improved in 1733, but the work had already been tranflated and publifhed in moft of the countries in Europe. How long the author continued to live after the emiffion of this improved edition is not known.

He had often, he fays, been required to let the world know, by advertifement, what kind of defects in the form of the body he was able to cure or relieve, but had not thought it expedient to do fo; thefe he has enumerated and defcribed at the end of the work. They are 22 in number; among them are the following: When the head, from a contraction of the tendons, fell on one of the fhoulders, he enabled the party to hold his head erect. On the other hand, when a child came into the world club-footed, fo that it could only touch the ground with its ankles, he completely, he fays, cured the defect, and he was fo fure of his principles, that he required no part of his ftipulated pay, until the cure was effected. Some time after his death, *viz.* in 1739, a pofthumous work was publifhed on the rickets, in his native language. Haller fpeaks favourably of it, and has given a brief analyfis of its contents, by which it appears to contain fome ufeful practical obfervations. Haller. Bib. Chir.

DEVENTER, in Latin *Daventria*, or *Devonturum*, in *Geography*, a confiderable and populous town of Holland, chief place of the department of Over Yffel, fituated on the river Yffel, over which it has a bridge of boats. It brews an excellent beer, is famous for its cakes, and has an academy, or *Gymnafium illuftre*, and a canon foundery. Anciently it was a free imperial Hanfeatic town. Deventer is the native city of James Gronovius, Henry Deventer, and Everard Bronchorft. It is 12 miles N. of Zutphen, 66 E. of Amfterdam, 51 W. of Benthem, in E. long. 5° 8′. N. lat. 52° 15′.

DEVEREUX, ROBERT, in *Biography*, fecond earl of Effex, a perfon of great diftinction in the reign of queen Elizabeth, was born at Netherwood, in Herefordfhire, in the year 1567. His father, Walter, earl of Effex, dying when Robert was but ten years old, left him to the guardianfhip of Cecil lord Burleigh. Two years after this event, he was fent to Trinity College, Cambridge, where he was put under the tuition of Dr. Whitgift, afterwards archbifhop of Canterbury. In his feventeenth year he was introduced at court, and in 1585 he accompanied the earl of Leicefter, who had married his mother, to Holland, where he fo much diftinguifhed himfelf at the battle of Zutphen, as to be created a knight banneret in the camp. Upon his return home, he was made mafter of the horfe in the place of the earl of Leicefter, who was advanced to the poft of high fteward; and in 1588 he accompanied the queen to Tilbury, to refift the Spanifh invafion, and was there appointed mafter of the horfe,

horse, and was decorated with the order of the garter. These high honours rendered him haughty and presumptuous, qualities which led him into serious difficulties. In 1589, he gave proof of his enterprizing disposition by joining, without leave, an expedition under the conduct of sir John Norris and sir Francis Drake, for the purpose of restoring Don Antonio to the throne of Portugal. In this business the earl of Essex had an opportunity of exhibiting his courage: while skirmishing in the neighbourhood of Lisbon, he challenged, by the sound of the trumpet, the governor, or any person of equal quality with himself, to single combat. Elizabeth, at first, expressed herself very indignantly at the conduct of the earl for leaving the kingdom without permission; but she was soon reconciled, and bestowed upon him signal marks of favour in various grants of land of considerable value. Upon the death of his father-in-law a new field seemed to be opened to his ambition: he made himself the head of the Puritan party, and married privately the widow of sir Phillip Sydney, with which the queen was displeased: she, however, very soon forgave him, and sent him with a body of 4000 men to the assistance of Henry IV. king of France, then fighting against the league. He was soon after created privy counsellor, and, in 1596, was appointed joint commander with lord Howard in an expedition to the coast of Spain. In this expedition, which makes a considerable figure in English history, lord Essex distinguished himself and acquired much popularity. At court he had many enemies, who were jealous of his fame, and envious of the honours which he acquired by his valour and heroism: these attempted to injure him in the sovereign's estimation, but without effect; she made him master of the ordnance; and when Ireland was threatened with a Spanish invasion, she appointed him to the chief command of a fleet equipped for the purpose. In this affair little glory was acquired by any concerned in it; and lord Essex was highly offended by the conduct of some of his brother officers; he was, however, soothed by his elevation to the dignity of earl marshal of England. When peace with Spain was proposed, he would listen to no terms of accommodation; in debating the subject in council he excited the anger of lord Burleigh, who drew out a prayer-book from which he read, addressing himself to lord Essex, "Men of blood shall not live out half their days." On this occasion he felt it necessary to vindicate himself from the opprobrium of being thought inimical to peace; he accordingly drew up an eloquent apology on the subject. On the death of lord Burleigh, he was appointed to the chancellorship of Cambridge. About this period a private council was called to determine upon a proper person to be sent governor of Ireland. Essex and the queen were at variance as to the fittest man. The dispute was warm, and the minister, unable to persuade his sovereign, contemptuously turned his back upon her. Provoked at his insolence, she bade him retire and be hanged, accompanying her command with a blow on the face. Essex, thrown off his guard, clasped his sword, swearing the affront was such as he could not and would not put up with. He withdrew in anger, and for some time seemed to set at defiance the queen's displeasure, but at length he submitted and was restored to favour. A renewal of troubles in Ireland required a new governor, and Essex was appointed to this office, which he accepted, though probably much against his inclination, for in a letter which he wrote to the queen before his departure, he asks, "From a mind delighting in sorrow, from spirits wasted with passion, from a heart torn in pieces with care, grief, and travel; from a man that hateth himself, and all things else that keep him alive; what service can your majesty expect, since any service past deserves no more than banishment and proscription to the cursedest of all islands?" He however went, but his success did not correspond with the expectations that had been formed by the queen, and that had indeed been excited by his own letters; he resolved to return to vindicate his conduct. Arriving unexpectedly, and in defiance of the commands under which he ought to have acted, he threw himself at the feet of his sovereign, who at first seemed to receive him with more favour than he had anticipated; but he was soon after treated with much severity, committed to private custody, examined with rigour before the council, and suspended from almost all his employments. He endeavoured to bear the reverse of fortune with patience and fortitude, but his feelings and passions overcame his reason, and he sunk into an alarming illness; during this he had the satisfaction of being favoured with some extraordinary tokens of the queen's remaining regard; and he might still have reinstated himself in her favour; but, being set at liberty, and listening to the dangerous counsels of Cuffe, who had been his secretary in Ireland, he seemed anxious to take revenge on his enemies. A conspiracy was formed against the person of the sovereign, which being discovered, lord Essex and others were apprehended under a charge of high treason. He and his chief adherent, the earl of Southampton, were committed to the Tower, and were afterwards tried by a jury of their peers, and were found guilty of the crimes with which they were charged. Sentence was pronounced, and the earl of Essex heard it with composure as a man prepared for his fate. The queen was long before she could be brought to sign the fatal warrant for the execution of her once favourite minister: she waited for an application for mercy, and construed his silence to an obstinacy not to be forgiven. He was executed on the 25th of February 1601. He met his death not with any apparent anxiety or terror, but with a humility and contrition which his religion inspired. He suffered in his thirty-fourth year. His character was adorned with many splendid virtues: he was brave, open, and affectionate; but it must be admitted that his conduct was often marked with rashness, violence, and precipitancy. He was a friend and the patron of literature. His memory has been always popular, and his unfortunate end has been the subject of four different tragedies. The queen, after the unfortunate death of her favourite, gave herself up to melancholy. She had given him a ring during the height of his favour, as a pledge, on the return of which she promised to pardon any offence he might commit. This ring, it is believed, the unhappy man entrusted to his relation the countess of Nottingham, who was not suffered by her husband, the capital enemy of Essex, to deliver it. The countess, on her death-bed, confessed the fact to the queen, imploring her forgiveness, of which she had not the smallest chance. "God may forgive you," exclaimed the indignant sovereign, "but I never can." Biog. Brit.

Devereux, Robert, son of the preceding, was born in 1592, and was of course old enough at his father's death to feel his unfortunate situation. He was at that time, or very soon after, entered at Merton College, Oxford, under the particular care of the warden, Henry Saville, who had been his father's intimate friend. King James, almost immediately upon his succession to the throne, restored the youth to all his hereditary honours. He was already in possession of his father's high spirit, of which he gave a sufficient indication in a quarrel which he had with prince Henry. Some dispute arose between them at a game at tennis; the prince called his companion the son of a traitor, who retaliated by giving him a severe blow with his racket; and the king was

obliged to interfere to reftore peace. At the age of fourteen this young man was betrothed to lady Frances Howard, who was ftill younger than himfelf. The earl immediately fet out on his travels, and during his abfence the affections of his young wife were eftranged from him, and fixed upon the king's favourite Carr, afterwards earl of Somerfet. The confequence was a fuit inftituted againft the hufband for impotency, in which, to the difgrace of the age, the king interfered, and which ended in a divorce. The earl of Effex, feeling himfelf difgraced by the fentence, retired to his country feat, and fpent fome years in rural fports and amufements. In the year 1620, being wearied of a ftate of inaction, he joined the earl of Oxford in a military expedition to the Palatinate, where they ferved with companies of their own raifing under fir Horatio Vere. In the following year they ferved in Holland, under prince Maurice. In the courfe of the winter they returned to England, and lord Effex appeared in the ranks of the oppofition in parliament. On this account he was not favourably received at court, which was the mean of attaching him the more clofely to foreign fervice. He commanded a regiment, raifed in England for the United States, in 1624, and though nothing very important was atchieved by the Englifh auxiliaries, yet the earl of Effex acquired experience, and diftinguifhed himfelf among the nobility of the time. On the acceffion of Charles I. he was employed as vice-admiral in an expedition againft Spain, which proved unfuccefsful. In 1626 he made another campaign in the Low Countries, and fhortly after he married the daughter of fir William Paulet, but his lady's conduct caufed a divorce within two years. He now refolved to give himfelf up entirely to public life: he courted popularity, and made friends among the officers of the army and the Puritan minifters. He was, however, employed by the king in various important fervices; but when the rafh meafures of government forced the fovereign and his court from the metropolis, lord Effex pleaded in excufe his obligation to attend in his place as peer of the realm; he was accordingly deprived of all his employments. This ftep fixed him in oppofition to the king, and in July 1642 he accepted the poft of general of the parliamentary army: he oppofed the king in perfon at Edge-hill, where the victory was fo indecifive, that each party claimed it as his own. After this he was fuccefsful in fome few inftances, but in other important trufts he did little to recommend him to the perfons in whofe interefts he was employed. He was, however, treated with external refpect; but the felf-denying ordinance (fee CROMWELL) threw him entirely out of the command: he refigned his commiffion, but not without vifible marks of difcontent. Unwilling to lofe him altogether, the parliament voted that he fhould be raifed to a dukedom, and be allowed ten thoufand pounds *per annum*, to fupport his new dignity. Neither of thefe were realized, and the earl died fuddenly, September 14, 1646. Parliament directed a public funeral for him, which was performed with great folemnity in the following month, at Weftminfter Abbey. Such was the end of this nobleman, whofe conduct as a warrior will be again referred to in feveral hiftorical articles of this work. With him the title of Effex became extinct. Biog. Brit.

DEVERON, in *Geography*, a river of Scotland, which runs into the Frith of Murray, at Banff.

DEVERRA, in *Mythology*, the tutelary goddefs of children.

DEVERRONA, the goddefs who prefided over the reaping of the crop or productions of the foil.

DEVESE, LA, in *Geography*, a fmall town of France, in the department of Gers, near Mirande; 24 miles S.W. of Auch.

DEVEST, DEVESTIRE, in *Feudal Writers*, is ufed for the oppofite to invefting. *Inveftire* fignifies *poffeffionem feudi tradere*. On the contrary, *deveftire* is *poffeffionem auferre*. Feud. lib. i. c. 7. Cowell.

DEVIAC, in *Geography*, a town of France, in the department of the Charente, and diftrict of Barbezieux; 15 miles S. of Angoulefme.

DEVIATAIA, a river of Siberia, which runs into the Ofenoka. N. lat. 62° 25′. E. long. 149° 34′.

DEVIATION, in the *Old Aftronomy*, a motion of the deferent, or eccentric, whereby it advances to, or recedes from, the ecliptic. See DEFERENT.

The greateft deviation of a planet is equal to the inclination of its orbit to the plane of the ecliptic. See INCLINATION *of a Planet*.

DEVIATION *of a falling Body*. The queftion of the diurnal revolution of the earth has long fince ceafed to be a difputed point. Neverthelefs, an experimental demonftration of the fact can never fail to merit attention.

It has been generally admitted, that a heavy body, defcending from a confiderable height, fhould not fall exactly on the point perpendicularly under it, but fhould deviate a very fmall quantity towards the eaft.

Let the point A, and the point B, directly under it, (*Plate* IX. *Aftronomy*, *fig.* 63.) be fuppofed to have a common motion in the direction A c, or B C, parallel to it, A c being equal to B C. If a body be let fall from A, it will fall on the point C, directly under c; but if A has a greater motion, previous to its defcent, as A c', it will then arrive at fome point C′ forwarder than C, or more diftant from B.

M. Guglielmini publifhed, in 1792, fome very curious experiments on this fubject, made at Bologna in a work entitled "De diurno terræ motu experimentis confirmato opufculum." The height was 241 French feet; and he found a deviation of 8 lines towards the eaft.

Similar experiments have been repeated lately by M. Henzenberg at Hamburgh.

From a height of 235 feet, he found the deviation 4 lines.

In each of the above experiments, a fmall deviation was obferved towards the fouth, the caufe of which it is not eafy to explain.

Laplace, who has inveftigated the theory of this phenomenon, gives the following refult:

Let h be the height;

g double the height a body defcends in one fecond;

n the angle of rotation of the earth in one fecond;

θ the co-lat. of the place.

The deviation towards the eaft will be equal to $\frac{2}{3}\, n\, h \sin.\theta \sqrt{\frac{2h}{g}}$.

This, in M. Henzenberg's experiment, gives 3.9 lines.

In M. Guglielmini's the obferved deviation was nearly double that indicated by the theory.

DEVIATION, in *Marine Infurances*, denotes a voluntary departure, without any neceffity, from the ufual courfe of the voyage infured. From the moment this happens, the voyage is changed, the contract is determined, and the infurer is difcharged from all fubfequent refponfibility. By the terms of contract, the infurer only runs the rifk of the voyage agreed upon, and of no other: and it is, therefore a condition neceffarily implied in the policy, that the fhip fhall proceed by the fhorteft and fafeft courfe to her port

of

of deſtination, and on no account to deviate from that courſe, but in caſes of neceſſity.

In determining what ſhall amount to a deviation that will diſcharge the inſurers, it ſhould be conſidered, that the courſe of the voyage does not mean the neareſt poſſible way, but the uſual and regular courſe. Stopping at certain places in the voyage, though out of the direct line, is no deviation, if it be cuſtomary ſo to do. The effect of a deviation is not to *vitiate* or *avoid* the policy, but only to determine it from the time of the deviation, and to diſcharge the inſurer from all ſubſequent reſponſibility; who is, nevertheleſs, entitled to retain the whole premium. The contract, however, is determined by the deviation, though the ſhip ſhould afterwards reſume her proper courſe, and be in a condition to complete the voyage. The true reaſon why a deviation diſcharges the inſurer, is not the increaſe of the riſk; but that the party contracting has, without neceſſity, ſubſtituted another voyage for that which was inſured. However, if a deviation can be juſtified by neceſſity, the inſurer will ſtill remain liable. One general principle pervades all the caſes on this point; namely, that if the captain, in departing from the uſual courſe of the voyage, acts fairly and *bonâ fide*, and according to the beſt of his judgment, for the benefit of all parties concerned, and has no other view but to conduct the ſhip and cargo, by the ſafeſt and ſhorteſt courſe, to her port of deſtination; what he does is within the ſpirit of the contract, and the voyage will ſtill be protected by it. In all caſes, therefore, in order to determine whether a departure from the direct courſe of the voyage inſured amounts to a deviation that will diſcharge the inſurer, it will be proper to attend to the motive, end, and conſequences of the act, as the true criterion of judgment. The caſes of neceſſity, which are moſt frequently adduced to juſtify a departure from the direct courſe of the voyage inſured, are ſtreſs of weather, want of neceſſary repair, joining convoy, eſcaping from, or avoiding an enemy, and mutiny of the crew. From an examination of the moſt approved authorities for determining caſes of this kind, it is inferred, that nothing will juſtify a deviation but a real and imperious neceſſity; and that the extent of the deviation muſt be juſtified by the degree of that neceſſity. Beſides, if a ſhip be compelled by any neceſſity to deviate from the uſual and regular courſe of the voyage, ſhe muſt purſue the new voyage of neceſſity ſo far as to get to her port of deſtination by the ſhorteſt and ſafeſt courſe ſhe can take; and any wilful departure from the direct courſe of this voyage, or any unneceſſary delay, will be a new deviation, which will diſcharge the under-writers in like manner as if it had been a deviation from the original voyage. Marſhall's Treatiſe on the Law of Inſurance, vol. ii. p. 392, &c.

DEVICE, in *Printing*. See DEVISE.

DEVICZA, in *Geography*, a town of Poland, in the palatinate of Sandomirz; 48 miles S.S.W. of Sandomirz.

DEVIL, DIABOLUS, an evil angel; one of thoſe celeſtial ſpirits, ſaid to have been caſt down from heaven, for pretending to equal himſelf with God.

The word is formed from the French *diable*, of the Latin *diabolus*, which comes from the Greek διαβολος, which, in its ordinary acceptation, ſignifies *calumniator*, *traducer*, or *falſe accuſer*, from the verb διαβαλλειν, *to calumniate*, *&c.*; or from the ancient Britiſh *diafol*.

Dr. Campbell, in his "Preliminary Diſſertations to the Four Goſpels," (vol. i. p. 182.) obſerves, that, though the word is ſometimes, both in the Old Teſtament and the New, applied to men and women of this character, it is, by way of eminence, employed to denote that apoſtate angel, who is exhibited to us, particularly in the New Teſtament, as the great enemy of God and man. In the two firſt chapters of Job, it is the word in the Septuagint, by which the Hebrew שטן, *Satan*, or *adverſary*, is tranſlated. Indeed, the Hebrew word, in this application, as well as the Greek, has been naturalized, ſays this writer, in moſt modern languages. Thus we ſay, indifferently, *the devil*, or *Satan*; only the latter has more the appearance of a proper name, as it is not attended with the article. There is, however, this difference between the import of ſuch terms, as occuring in their native tongues, and as modernized in tranſlations. In the former, they always retain ſomewhat of their primitive meaning, and, beſide indicating a particular being, or claſs of beings, they are of the nature of appellatives, and mark a ſpecial character, or note of diſtinction in ſuch beings. Whereas, when thus Latinized or Engliſhed, they anſwer ſolely the firſt of theſe uſes, as they come nearer the nature of proper names. Διαβολος, as Dr. Campbell has obſerved, is ſometimes applied to human beings; but nothing is more eaſy than to diſtinguiſh this application from the more frequent application to the arch-apoſtate. One mark of diſtinction is, that, in this laſt uſe of the term, it is never found in the plural. When the plural is uſed, the context always ſhews that it refers to human beings, and not to fallen angels. It occurs in the plural only thrice, and only in the epiſtles of St. Paul. 1 Tim. iii. 11. 2 Tim. iii. 3. Tit. ii. 3. Another criterion, he ſays, whereby the application of this word to the prince of darkneſs may be diſcovered, is its being attended with the article. The term almoſt invariably, with a few exceptions, is ὁ διαβολος. The excepted inſtances occur in the addreſs of Paul to Elymas the ſorcerer, Acts. xiii. 10; and that of our Lord to the Phariſees, John viii. 4. The more doubtful caſes are thoſe in 1 Pet. v. 8, and Rev. xx. 2. Theſe, ſays Dr. Campbell, are all the examples in which the word, though uſed indefinitely or without the article, evidently denotes our ſpiritual and ancient enemy; and the examples, as he adds, in which it occurs in this ſenſe, with the article, are too numerous to be recited. Thoſe who maintain the doctrine of a devil and of his agency, and the opinion of his being and influence has for a long time and very generally prevailed, ſuppoſe that there are various orders of evil angels, united under one head, who from the malignity of his nature is called *Satan*, or the *devil*. In proof of the exiſtence and influence of theſe inveterate enemies of God and of mankind, and of their original apoſtacy and rebellion, and of their ſubſequent influence over mankind, they refer to the hiſtory of the fall of our firſt parents, and to a variety of paſſages in the ſacred writings. See Matt. iv. 5—8; xii. 24. 28; xxv. 41. Epheſ. ii. 2; vi. 12. Col. ii. 15. Jude, v. 6. Rev. xii. 7. Theſe inviſible beings, it is ſaid, urged by a principle of enmity to God, and envy and malice againſt mankind, do their utmoſt to ſeduce men into ſin; and for that purpoſe are employed in ſtudying men's tempers, and making obſervations on the various circumſtances and occurrences of their lives. (1 Chron. xxi. 1. Zech. iii. 1, 2. Matt. xiii. 19. Luke, xxii. 31. John, viii. 44; xiii. 20. 22. Acts, v. 3. 2 Cor. ii. 11; iv. 4; xi. 3, 14, 15. Eph. ii. 2; vi. 11, 12, 16. 1 Theſſ. iii. 5. 2 Theſſ. ii. 9, 10, 18. 1 Pet. v. 8.)

Theſe malignant ſpirits, it is ſaid, are made uſe of as the inſtruments of divine Providence, to inflict calamities on the children of men; whilſt their malicious attempts are over-ruled by the ſuperior wiſdom and goodneſs of God, to anſwer the purpoſes of his government. (Luke, xiii. 16. 1 Cor. v. 5. Job, i. 2. 1 Tim. i. 20. Heb. ii. 14, 15.) They ſometimes, as the advocates of this opinion maintain, carry on their attempts in a ſecret and inviſible manner; and

they

they ſometimes interpoſe more openly and without diſguiſe, or at leaſt have formerly been permitted to do ſo; particularly in the inſtances of dæmoniacal poſſeſſions, oracles, magic, witchcraft, and violent ſuggeſtions, and impulſes. It has alſo been an opinion generally received, that the devil has in ſome caſes entered into the bodies of men, and afflicted them ſeverely, by his ſupernatural agency. And even thoſe, who have rejected all ſtories of magical operations, performed by a combination with the infernal ſpirits, or of diabolical appearances; as being either the dreams of a diſordered imagination, the contrivance of art, or the vain fictions of thoſe who aimed at impoſing upon mankind; have nevertheleſs maintained, that Satan appeared in a viſible form to Chriſt, and that he animated the body of a ſerpent in the firſt temptation. From the ſeveral paſſages and facts above adduced, it has been inferred by the advocates of dæmoniſm, that the devils are beings of great power and knowledge; and that the purpoſes to which they ſeem to have interpoſed have generally been ſo malignant, as ſufficiently to prove they are evil dæmons, and as ſuch to be denounced and deteſted: and ſuch appearances, where Chriſtianity is known, ſhould be conſidered as confirming rather than weakening it: ſince the exiſtence, power, and malice of Satan conſtitute ſo great a part of the Chriſtian ſcheme. Where the goſpel is unknown, natural religion might teach men that there is a ſovereign almighty being of the moſt benevolent nature, and conſequently that theſe miſchievous beings were to be deteſted as his enemies, whatever power they might have, from which he would not fail to protect them who ſhould faithfully ſerve him. (See 2 Theſſ. ii. 9. 12.)

On the other hand, many objections have been alleged againſt the empire and agency aſcribed to the devil; and ſome have even denied his exiſtence, as well as his interference in the concerns and influence on the minds of men. Accordingly, it has been argued that we find no mention of the word devil in the Old Teſtament; but only of Satan, nor do we meet with the word devil in any heathen authors, in the ſignification attached to it among Chriſtians; that is, as a creature revolted from God: their theology went no farther than to evil genii or dæmons, who haraſſed and perſecuted mankind. Thus the Chaldæans believed both a good principle, and an evil principle, which was an enemy of mankind. See DÆMONS, and DÆMONIACS.

It has alſo been urged, that the agency of a being altogether malevolent, who is to every practical purpoſe omnipreſent and omniſcient, and endowed with formidable and indefinite powers, whoſe ſole employment is to do miſchief, and to tempt men to ſin, implies ſuch a reflection upon the wiſdom and benevolence of the Supreme Sovereign, that nothing ſhort of the moſt deciſive evidence can eſtabliſh the fact. For which purpoſe it ſhould firſt be proved, that the ſacred writers believed and taught the exiſtence and agency of this ſtrange and anomalous being; and, ſecondly, that this doctrine was communicated to them by revelation, and that they were authorized to make it known to the world. If neither of theſe points, ſay the antidæmoniſts, can be evinced to the ſatisfaction of an intelligent and critical reader of the Scriptures, the doctrine itſelf is untenable. It is alleged, that the exiſtence of an evil ſpirit is no where expreſsly taught as a doctrine of revelation; that it was unknown to the Jews previouſly to the captivity; and that it was probably borrowed by their learned men, at that time, from the oriental philoſophy, of which it is well known to have conſtituted an eſſential part. After their return it became, in proceſs of time, the popular creed, and the popular language, being gradually faſhioned to it, was adopted equally by thoſe who did, and thoſe who did not believe the theory upon which it was founded. Hence in the New Teſtament we find evil, natural and moral, often aſcribed to the devil, to dæmons, or the ghoſts of wicked men. But neither Jeſus nor his apoſtles, it is ſaid, ever explicitly declare, that they themſelves admitted the philoſophy which governed the language of the country in which they lived, much leſs do they profeſs to teach it as of divine authority. They leave the mythology of evil ſpirits, like many other popular opinions and prejudices, in the ſame ſtate in which they found it, to be corrected in the courſe of time by the principles which they taught, and by the growing good ſenſe of mankind. The firſt teachers of Chriſtianity neither poſitively affirm, nor authoritatively contradict, the exiſtence and agency of an evil ſpirit; but expreſs themſelves upon this ſubject exactly as the reſt of their contemporaries would; and they content themſelves with eſtabliſhing principles, which ſerved gradually to undermine and expoſe the vulgar and popular opinion. It has been ſaid, that the evil ſpirit is entitled to the denomination of the prince of this world (John, xiv. 30.) The true meaning of this expreſſion may probably be, that Jeſus was about to be unjuſtly arreſted by order of the magiſtrate. A ſimilar expreſſion occurs in 1 Cor. ii. 8; where the Jewiſh rulers who crucified our Lord are certainly the perſons intended. As for the paſſage in Jude, v. 6, it ſhould be recollected, that the writer of this obſcure epiſtle is arguing with his readers upon their profeſſed principles, alluding to a mythology which was probably at that time familiar, but is now loſt; nor can any thing be inferred from a compoſition, the genuineneſs of which is known to be very doubtful. But whatever be the true meaning of the paſſage, it proves nothing concerning diabolical agency; for it repreſents the fallen angels not as ranging at liberty, but as bound in chains. Thoſe who reject the notion of diabolical agency, allege the total want of evidence to prove it. As philoſophers, they diſcover no phenomena which countenance the hypotheſis of an inviſible malignant energy; and as attentive readers of the Chriſtian Scriptures, they ſee nothing to warrant ſuch a concluſion, but a ſort of language which a competent acquaintance with the oriental ſtyle would teach them to interpret in a figurative and mythological, and not in a literal and hiſtorical ſenſe. The principle of evil, they ſay, is perſonified, and the properties, operations, and effects of this principle are aſcribed in the eaſtern language and in the ſacred writings to a malignant being. The empire and agency of ſuch a being, in the natural and in the moral world, are ſaid to be incompatible with the rank and powers aſſigned to all creatures, and with the limited ſphere of their operation, and equally inconſiſtent with the rectitude and benevolence of the Supreme Ruler of the univerſe, who would not ſubject his rational offspring, frail and erring in themſelves, to a conflict with powers ſo ſuperior to their own, and the exerciſe of which is ſo adverſe to their ſpiritual and immortal intereſts, as well as to their temporal welfare. It has been further ſaid, that the doctrine of diabolical agency, in the extent to which ſome have maintained it, has an immoral tendency, furniſhes a plea for criminal conduct, and diminiſhes the guilt of the tranſgreſſor; not to add, that it has been the occaſion of a variety of ſuperſtitious opinions and practices of the moſt abſurd and flagitious kind.

The relation we have of the religion of the Americans aſſures us of ſome idolatrous nations, who worſhip the devil: but the term devil muſt not be here taken in the common ſenſe: thoſe people have an idea of two collateral independent beings; one whereof is good, and the other evil. And they place the earth under the guidance and direction of that evil being, which our authors, with ſome impropriety, call the devil.

devil. The Ethiopians paint the devil white, to be even with the Europeans, who paint him black. Ludolph.

Devil *in a buſh*, in *Botany*. See Nigella.

Devil *in a buſh*, in *Agriculture*, the vulgar name of a weed which is extremely troubleſome in corn lands. Its ſtalks are ſlender, riſing to the height of about a foot, ſometimes branching out at the bottom, having fine cut leaves, ſimilar to thoſe of Dill. The flowers are blue, but the feeds are of a blackiſh colour, and rough; from which circumſtance they are highly injurious to wheat, when ground with it. From its being an annual plant, it may be readily extirpated, by being pulled up by the root before it flower.

Devil's *Bit*, in *Botany*. See Scabiosa.

Devil's *Bit*, in *Agriculture*, a name vulgarly applied to a weed which infeſts both corn and paſture, or meadow-lands, (*Leontodon autumnale*). It has a ſtrong, thick, fibrous perennial root, running deep into the ground, and which ſends out ſeveral branching ſtalks, riſing to the height of three feet. It is beſt deſtroyed by having it drawn up by the roots.

Devil's *Bit, yellow*, in *Botany*. See Leontodon.

Devil's *Guts*, in *Agriculture*, a name often vulgarly applied to bind-weed; (*Convolvulus arvenſis.*)

Devil's *Iſlands*, in *Geography*, are iſlets, or ſmall ſhoals, the moſt conſiderable of which bears the name of *Joura*, which form the extremity of a chain of iſlands and rocks, placed before the entrance of the gulf of Salonica, and extending to the eaſt, from the great promontory of Volo, the ancient Œantium of Theſſaly, till it faces mount Athos.

Devil's *Iſland*, an iſland of America, on the eaſt ſide of Cheſapeak bay, in Somerſet county, Maryland, between Fiſhing bay and Nanokin river.

Devil, *Iſle of*, one of the ſmaller Molucca iſlands.

Devil's *Mouth*, a name given by ſailors to a frightful volcano, near Leon Nicaragua, in New Spain, ſeated near the lake. N. lat. 13° 10′. W. long. 65° 10′.

Devil's *Noſe*, a promontory on the ſouth ſide of lake Ontario, 16 miles E. of Fiſhing bay, and 23 N. W. of the mouth of Geneſſee river.

Devil, *Sea*, *Diabolus marinus*, in *Ichthyology*, the name of an ugly and ſtrangely ill-ſhaped fiſh. Its noſe or ſnout is bifid, and runs out into two horns; and its ſides are both terminated by thin fins: its ſkin toward the head is variegated with duſky ſpots. It grows to a very conſiderable ſize, being ſometimes caught to ſix or ſeven feet length. Ray's Ichthyology. Append. p. 5. See Lophius.

Devil's *Wall*, in *Geography*, a rock of Hungary, near Gyongyes, in the Matra mountains, forming a façade of thirty feet or more in height, which is conſidered as a natural curioſity. Dr. Robert Townſon, in his travels in Hungary, found it to be nothing more than what is known in Scotland by the name of whin dykes, and attributes its height to the waſhing away of the rocks through which it runs. It is compoſed of a porphyric baſaltes. Many looſe blocks approach nearer to porphyry.

DEVINCTION, Devinctio, in *Antiquity*, was uſed to ſignify a love-charm or incantation to gain the affection of a perſon beloved.

It was done by tying knots, and differed little from what was called obligatio, or catadeſmus. Virgil, in his eighth Eclogue, deſcribes it thus:

"Necte tribus nodis ternos, Amarylli, colores:
Necte, Amarylli, modo; & Veneris die, vincula necto."

DEVISE, Device, or Badge, in *Heraldry*, a name common to all figures, cyphers, characters, rebuſes, mottoes, &c. which by their alluſion to the names of perſons or families, denote their qualities, nobility, or the like.

Deviſe, in this ſenſe, is of a much older ſtanding than heraldry itſelf; being that which gave the firſt riſe to armories. Thus, the eagle was the deviſe of the Roman empire: S. P. Q. R. was the deviſe of the Roman people, and ſtill continues to be what they call the eſcutcheon of the city of Rome.

The firſt deviſes were mere letters diſtributed on the borders of the liveries, houſings, and banners, and at length on the ſhields. Thus the K was the deviſe of the French kings of the name of Charles, from Charles V. to Charles IX.

There were alſo deviſes by rebuſes, equivocals, or alluſions, both to names and arms. The dukes of Guiſe took for their deviſe an A in an O, to ſignify, *chacun A ſon tour*, every one in his turn: and the houſe of Seneſai, *in virtute & honore ſeneſces*: ſome, that had towers in their arms, *turris mea Deus*, &c.

There are alſo enigmatical deviſes: as that of the Golden Fleece, with *Autre n'aurai*; intimating, that Philip the Good, who inſtituted that order, renounced every other woman but Iſabella of Portugal, whom he then married. Deviſes ſometimes contain entire proverbs: as that of Cæſar Borgia, *aut Cæſar, aut nihil.*

The word deviſe is formed from the Latin *dividere*, and was applied to the things juſt mentioned, as well as thoſe hereafter mentioned; becauſe they ſerve to divide, ſeparate, and diſtinguiſh perſons, parties, &c. Father Menetrier obſerves, that there are as many different kinds of deviſes, as there are different manners of diſtinguiſhing one another, or as there are ſimple figures or words, capable of expreſſing qualities, offices, virtues, actions, &c. of perſons; and of notifying, or diſtinguiſhing them from others.

Badges, impreſſes, and deviſes were greatly in vogue in England from the reign of king Edward I., until that of queen Elizabeth, when they ſunk into diſuſe. Several heraldic writers contend that this event was owing to the diſcontinuance of tilts, tournaments, juſts, and other once faſhionable public and ſolemn proceſſions. They further tell us, that after ſuch diſcontinuance the nobility placed on wreaths and coronets, and bore as creſts, thoſe ſeveral figures which they and their dependants had before worn as badges and deviſes; but in this reſpect they are probably miſtaken, more eſpecially as many of the now exiſting ancient families of the nobility ſtill retain and wear the badges which belonged to their anceſtors.

Devise is now taken, in a more reſtrained ſenſe, for an emblem; or a repreſentation of ſome natural body, with a motto, or ſentence, applied in a figurative ſenſe, to the advantage of ſome perſon.

Father Bouhours gives an accurate explication of the word deviſe, in an extract inſerted in the Memoirs de Trevoux. A deviſe, ſays he, is a compoſition, or aſſemblage of figures drawn from nature and art, called the body; and of a few words adapted to the figure called the ſoul: ſuch a compound, adds he, we make uſe of to denote our thought, or intention, by compariſon: for the eſſence of the deviſe conſiſts in a compariſon: taken from nature, or art, and founded on a metaphor.

This he illuſtrates in the following inſtance: a young nobleman, of great courage and ambition, bore, for his deviſe, in the laſt carouſal at the court of France, a rocket mounted in the air, with this Italian motto, "poco duri," purche m'inalzi;" may I laſt but a ſhort time, provided I mount high: which may be explained thus: as the rocket riſes a great pitch, though it only endures a little while, ſo it

it does not concern me to live long, provided I attain to glory and eminence; which is a juſt compariſon.

On this footing, a deviſe, to define it rightly, is a painted metaphor; or rather an enigma inverted: for, whereas enigmas repreſent nature, or art, by the events of hiſtory, and the adventures of fables; a deviſe is a repreſentation of human qualities by natural, or artificial bodies.

Thus to expreſs the character of Louis XIV. a ſun was painted; which yet, luminous as it is, has more power than luſtre: and the better to determine the ſenſe of the painting to this ſignification, the Caſtilian motto is added; "Mas virtud que luz." The perſonal merit of Mary, queen of Scots, was repreſented by a pomegranate, with theſe words: "Mon prix n'eſt pas de ma couronne:" and the talent of an apoſtolical perſon, who became all things to all men, by a looking-glaſs, with thoſe words of Saint Paul, "Omnibus omnia."

Deviſes are uſed on coins, counters, ſeals, ſhields, triumphal arches, artificial fire-works, and other ſolemnities. They are a ſort of images, very pertinently and artfully repreſenting the enterpriſes and intrigues of war, love, piety, ſtudy, fortune, &c.

The French have diſtinguiſhed themſelves in this way, eſpecially ſince the time of cardinal Mazarin, who had a wonderful fancy for deviſes.

The Italians have reduced the making of deviſes into an art, and laid down laws and rules for this purpoſe. Some of the principal are, 1. That there be nothing monſtrous, or extravagant, in the figures; and nothing contrary to the nature of things, or to the common opinion of mankind. 2. That figures be not joined which have no affinity, or relation, to each other; the metaphor being to be founded on ſomething real, and not on hazard, or imagination, excepting ſome whimſical combinations eſtabliſhed in mythology, which cuſtom, and the authority of the poets, have made paſs for natural. 3. That the human body be never taken into deviſes; as this would be to compare a man with himſelf. 4. That there be a ſort of unity in the figures which compoſe the body: we do not mean, that there muſt only be a ſimple figure; but that, if there be ſeveral, they muſt have a relation, and ſubordination to each other, ſo that there be one principal figure whereon all the reſt depend: though ſtill the fewer figures there are in the body of the deviſe, and the leſs they are confuſed, the more perfect and elegant is the deviſe. 5. The motto, which is to animate the figure, muſt agree ſo accurately thereto, as that it could not ſerve for any other. 6. Nothing is to be named that appears to the eye, and which the bare inſpection might notify. 7. The motto is to have a complete ſenſe of itſelf; for, being to make a compound with the figure, it muſt only be a part, and, conſequently, muſt not ſignify the whole. If the words alone have a complete ſignification, you have a full and diſtinct notion independently of the figure; whereas the ſignification ſhould reſult from both. 8. The ſhorter the motto, the more beautiful: and a ſuſpenſion of the ſenſe, which leaves ſomewhat to gueſs, is one of the principal graces of the deviſe. Laſtly, it is accounted a happineſs, where the words of a poet are applied in a ſenſe which he never dreamed of, and yet ſo pertinently, that it ſhould ſeem they had been intended for the ſame.

Deviſe, or *Diviſe*, in *Common Law*, the act whereby a teſtator gives, or bequeaths, his lands, or goods, by his laſt will, in writing. Though, in ſtrictneſs, a deviſe of goods is more properly termed a bequeſt.

He who makes the deviſe is called the deviſor; and he to whom it is made, the deviſee.

A deviſe in writing is, in conſtruction of law, no deed; but an inſtrument by which lands are conveyed.

The words of a will the law interprets in a larger, and more favourable ſenſe, than thoſe of a deed: for if land be deviſed to a man to have to him for ever, or to have to him and his aſſigns; in thoſe caſes, the deviſee ſhall have a fee ſimple: yet if given in the ſame manner by feoffment, he ſhall have but an eſtate for life.

So, if one deviſe land to an infant in his mother's belly, it is a good and valid deviſe; though it is otherwiſe by feoffment, grant, or gift. For, in thoſe caſes, there ought to be one of ability to receive preſently; otherwiſe it is void. See Deed, and Will.

Deviſe, *Executory*. See Executory *Deviſe*.

DEVIZES, in *Geography*, a market and borough town of Wiltſhire, England, is a place of remote antiquity; and though it has not been proved to be a Roman ſtation, yet various ancient remains, belonging to the Romans, have been found here. Dr. Stukeley contends, that a town, a ſtation, called *Punctuobice*, occupied the ſite of the preſent Devizes, and that it was ſurrounded by a "vallum and ditch." Dr. Davies, in a work containing much ingenious criticiſm, entitled "Origines Diviſianæ," controverts the opinion of Stukeley. A ſtrong caſtle, on a commanding ſituation, was built here at an early period. This was occupied by Roger biſhop of Sarum, during the reign of Henry I.; and here, in the ſucceeding reign, the biſhop, with his ſon, and nephews, were made priſoners within its gates. In the various civil wars that progreſſively occurred in England, this caſtle was the ſcene of repeated conflicts, and its walls frequently aſſaulted. In the 27th year of Edward I, that monarch ſettled this caſtle and town, with ſeveral other places in Wiltſhire, on his queen Margaret, by way of dower. Leland deſcribes this fortreſs in the following terms. "It ſtood on the ſouth-weſt ſide of the town, ſtately advanced on a high ground, defended partly by nature, partly by dykes. It was made by biſhop Roger; and ſuch a piece of caſtle work, ſo coſtly and ſtrongly, was never afore, or ſince, ſet up by any biſhop of England. The keep, or dungeon, on a hill caſt up by hand, is a piece of work of incredible coſt; there appeared on the gate ſix or ſeven places for portculliſes, and much goodly building was in it. It was then ruined; part of the front of the towers of the gate of the keep and chapel was carried full improfitably to build Mr. Baynton's place at Bromham, ſcarce three miles off; and divers goodly towers in the outer hall were going to ruin; the principal leading into the town was yet of great ſtrength." The fortreſs thus deſcribed, has ſince been entirely deſtroyed; and nothing remains but parts of the valla and mount. Theſe are now encloſed within the pales of a gentleman's ſhrubbery.

During the civil wars of the ſeventeenth century, Devizes was occupied by a party of the king's army, which was attacked by the parliamentary forces under ſir William Waller. A dreadful battle enſued, and terminated in favour of the royaliſts. About ſix hundred of the parliamentary ſoldiers were ſlain, and nine hundred more taken priſoners.

As a borough, Devizes has had ſeveral charters granted it by different monarchs. The firſt of theſe was conferred by the empreſs Maud, and confirmed by her ſon, Henry I. Succeeding kings either ratified, or extended the liberties and immunities of the burgeſſes.

The town occupies an elevated ſite, and is therefore deprived of any river; which is of ſo much importance and utility to places of trade, and indeed to every ſpot where perſons

persons make a permanent settlement. Devizes consists of two parishes, and a chapelry: and is provided with two churches and one chapel, belonging to the established religion. Besides these there are four meeting-houses.

Richard of Devizes, and Joseph Allen, were natives of this town.

About two miles north-east of Devizes is Roundway-hill, on the summit of which is a large entrenchment, which comprehends an area of about 140 yards, by 120 yards. North-east of this is another large earth-work fortress, called Oldbury castle. Between these are a very considerable vallum and ditch, which extend several miles from west to the east, and is known by the name of Wansdyke. In the vicinity of Devizes is New park, a handsome seat, belonging to Mrs. Sutton: and Stoke park, the seat of Joshua Smith, esq. M.P. The latter house is a commodious and handsome building, and the park abounds with fine woods, and is ornamented with a large lake.

Devizes contains 890 houses, and 4851 inhabitants. It has two weekly markets, and six fairs annually.

DEULE, a small river of the department of the North in France, which forms the canal of Douay at Lille, and runs into the Lys.

DEULEMONT, a town in France, in the department of the north, at the conflux of the Deule and the Lys; six miles N. W. of Lille.

DEUNA. See DEVA.

DEUNX, a division of the Roman libra, or pound, containing eleven ounces; or eleven twelfths of any thing. See As.

DEVOIRS OF CALAIS, in our *Old Statutes*, customs due to the king for merchandize brought to, or carried out of Calais, when our staple was there. 34 Edw. III. c. 18. and 2 Rich. II. stat. 1. c. 3.

Devoir is French, signifying *duty*.

DEVOLVED, something acquired by right of devolution. Such a right is devolved to the crown: such an estate devolved on M—— by the death of N——.

The word is also used for a right, acquired by a superior, of conferring a benefice, when the inferior, and ordinary collator, has neglected to confer, or has conferred it on an unqualified person.

If a patron neglects to present a benefice in six months, the presentation lapses, or devolves, upon the bishop, from thence to the primate, and from thence to the king.

DEVOLUTION, in the *French Law*, a right acquired by descent, or succession, from degree to degree.

Devolution, in general, is an impediment provided by the customs of several provinces, whereby the husband who survives his wife, or the wife surviving her husband, is prohibited to alienate the real and immoveable effects of the deceased, and obliged to preserve them for the children issued from that marriage; so that they may succeed thereto in exclusion of those born of a second marriage.

DEVON, in *Geography*, a river of Scotland, in Clackmannanshire; which is navigable for barges to the coal mines near Madlock fort, about 2½ miles from its influx into the Forth river.

DEVONA, in *Ancient Geography*, a town of Germany, according to Ptolemy.

DEVONSHIRE, in *Geography*, a county of England, bounded on the north by the Bristol channel, on the south by the English channel, on the east by Somersetshire and Dorsetshire, and on the west by Cornwall. This area of country measures about 73 miles in length, and 63 in breadth; and is estimated to contain nearly 1,600,000 acres of land. The external aspect of the county is exceedingly varied and irregular; and the heights in many parts, but particularly in Dartmoor and its vicinity, swell into mountains: the altitudes of the principal eminences being from 1500 to 1800 feet. On approaching this tract from the south and south-east, the eye is bewildered by an extensive waste, exhibiting gigantic tors, large surfaces covered with vast masses of scattered granite, and immense rocks, which seem to have been precipitated from the steep declivities into the vallies. A prominent natural feature of this county is Dartmoor, or Dartmoor Forest, which has been already described in a former volume of this work.

The vale of Exeter differs widely in appearance from Dartmoor; though in some parts, particularly between Tiverton and Exeter, and the latter place and Collumpton, it has an irregular billowy surface, and presents eminences of considerable magnitude; but the central and southern parts preserve the vale character. The area of this district contains about 200 square miles: its boundaries on the north, are the hills that range from Clanaborough, by Halberton and Uffculm, to Blackdown, a dreary mountainous ridge, which, with its contiguous branches, skirt the eastern side of the vale: on the south-east it is bounded by the heights of Sidmouth-hill, East-down, and Woodbury; and on the west by the mountainous tract of Haldon, and the undulating eminences that stretch toward Bow. The district called the South-hams, is frequently termed the garden of Devonshire, from its fertility. Its natural boundaries are Dartmoor, and the heights of Chudleigh, on the north; Plymouth Sound on the west; Torbay on the east; and on its southern point, the English channel. Its area, including the rich valley of the Dart, which extends towards Ashburton, comprehends nearly 250 square miles. This tract is strikingly diversified by bold swells, winding coombs, and fine vales; and in many parts, particularly towards the north, the scenery is picturesque, and highly romantic. Numerous springs flow from the sides of the hills, and uniting into brooks and rivulets, spread luxuriance and beauty through a considerable extent of country. Great quantities of cyder are made in this district, as well as in the vale of Exeter; and as almost every farm has its orchard, the general produce affords a considerable surplus for exportation. Preference is generally given to those apples which are most juicy, yet they are seldom sorted: the red-streak is the species considered as most productive. The sweet cyder is chiefly made in the vicinity of Staverton, but of the same kind of fruit as the rough: the sweet taste arises from its being often racked, which checks the fermentation. The cyder made in the neighbourhood of Exeter, Chudleigh, Newton-Bushel, Peignton, Totness, and some contiguous places, is deemed of superior flavour. In this district also a considerable quantity of butter is made: the mode of producing the cream is almost peculiar to Devonshire; it is raised by heating the milk in earthen or brass pans, and is then worked into butter by the hand of the dairy-maid, who turns it all one way in a bowl or tub, without the assistance of the churn. After the cream is taken off, the scalded milk is made into an inferior kind of cheese.

The breed of catttle in Devonshire is spoken of by Mr. Marshall, in his Rural Economy of the West of England, as being in many respects the most perfect in England. This accurate observer imagines all the varieties to be sprung from the native breed of the island, and remarks, that with the exception of colour, they exactly resemble the wild cattle which are still preserved at Chillingham park, in Northumberland. The Devonshire breed are of the middle-horned kind, but vary considerably, both in size and form, in different parts of the county. "North Devon," says Mr.

Mr. M., " takes the lead in both theſe particulars; and its breed are in both nearly what cattle ought to be. In ſize, they are rather below the deſirable point for the heavier works of huſbandry; but they make up for this deficiency, in exertion and agility; and are, beyond compariſon, the beſt workers I have any where ſeen. As dairy cattle the Devonſhire breed are not excellent; rearing for the eaſt-country graziers having long been the main object of the farmers of this county; but as grazing cattle, individuals in every part of the county ſhew the breed to be excellent. In Weſt Devonſhire the breed is conſiderably ſmaller than in the northern diſtrict, and their quality in every reſpect lower." Oxen have, from time immemorial, been the plough-team of this county; ſometimes with horſes before them, but more generally alone. Four aged oxen, or ſix growing ſteers, are the uſual number yoked to one plough.

Among the products of Devonſhire ſhould be noticed the great variety of fiſh which abound in its rivers and on its coaſts; and, in addition to the home conſumption, afford a very conſiderable ſupply to the Bath and London markets. In the rivers Tamar and Tavy, great numbers of ſalmon are annually taken, producing large ſums to the proprietors of the eſtates which have the right of fiſhing. The ſalmon-fiſhery on the Tavy is appendant to the lands of Buckland-place, the ſeat of the Drake family, by whoſe anceſtor, the celebrated circumnavigator, the eſtate was purchaſed. The weir belonging to this fiſhery is a work of conſiderable magnitude. It conſiſts of a ſtrong dam, about twelve feet high, thrown acroſs the river in a part where two projecting rocks ſerve as buttreſſes to the maſonry, which is built arch-wiſe to reſiſt the preſſure and force of the waters in times of flood, when they collect from the ſlopes of the Dartmoor hills, and ruſh down with extraordinary impetuoſity. The fiſhing ſeaſon commences in the Tavy about the middle or latter end of February, (but on the Tamar not till ſeveral weeks later,) and cloſes in October or November, when the weir is thrown open. When the water is clear, many ſalmon are taken with the ſpear by poachers, who throw this weapon with great dexterity. The ſalmon of the Tamar and Tavy are of inferior quality to thoſe taken in many other rivers in Devonſhire. Thoſe of the Exe are conſidered the moſt delicate, and fineſt flavoured. In the river Dart they are caught in great abundance; their uſual weight is from ſix to fourteen pounds each: though they are frequently taken of the weight of twenty pounds or upwards. Thoſe that aſcend the Teign are often ſold at Chudleigh ſo low as two-pence or three-halfpence *per* pound. The prevailing river fiſh of Devon is the trout, which are provincially called ſhots, from their rapid motion through the water. The river Otter is remarkable for its trout, and ſalmon-peal; the former having a peculiarly rich flavour, and the latter being very large and firm. The plaiſe of the Devonſhire rivers are eſteemed particularly delicious; more ſo, perhaps, than thoſe of any other part of the world. The torpedo, or electric ray, has occaſionally been caught at Torbay, and ſometimes in the river Dart.

The mineralogical ſubſtances of Devonſhire are various and numerous; and from the confuſed intermixture of the ſtrata in different parts of the county, it is conſidered that earthquakes or volcanoes have prevailed here at ſome remote periods.

Among the minerals of the calcareous genus, lime-ſtone is the moſt conſiderable, being found of almoſt every deſcription in different parts of the county: many quarries have been opened, to procure it for the purpoſes of agriculture, building, and ornament. In the eaſtern part of Devon it approaches to the nature of chalk, and, in general, is ſcarcely ſuſceptible of a poliſh: in other parts, and particularly in the South-hams, it aſſumes the qualities of marble, and for hardneſs and beautiful veinings, reſembles the beſt marbles of Italy; and when poliſhed, is hardly inferior in luſtre. In the pariſh of South Moulton are many quarries of black marble, variegated with ſmall ſtreaks of white, which takes a fine poliſh, but is moſtly burnt into lime. Gypſum is obtained in various parts of the county, though not in particular abundance: near Plymouth it appears in union with the lime-ſtone. It is alſo found at Salcombe-Regis, and at many places in the lime-ſtone diſtrict, ſouth-weſt of Exeter. In the mines of Beer-Ferris fluor-ſpar is procured in great plenty, and of ſeveral varieties, both as to ſhape and colour: a ſpecimen of ſtellated ſpar has been found at Oxton, near Haldon.

Argillaceous ſubſtances abound in almoſt every part of the county. In the vale of King's-Teignton, pipe and potter's clay is procured in great quantities; and ten or twelve thouſand tons are annually ſent from the port of Teignmouth, to ſupply the potteries of London, Liverpool, and other parts. Schiſtus is common to almoſt the whole county, and conſiſts of a great number of laminæ, differing in thickneſs, from three feet to half an inch.

In the ſilicious claſs are quartz cryſtals, which have been found in various parts of Devonſhire, but generally very ſmall. On Dartmooor they have been ſometimes met with in the fiſſures of the granite: they have alſo been diſcovered in abundance in the red ſoil, or rock, at Rougemont caſtle; and near Samford-Spinney, in great plenty: their common form is the hexagonal priſm, terminating with two pyramids. Flints exiſt in great abundance, but particularly in the mountainous tract of Haldon. The principal kinds of free-ſtone are dug in the pariſhes of Salcombe, Branſcombe, and Beer.

Varieties of lava, here called iron-ſtone, whin-ſtone, and baſalt, are found in different parts of the county, and bear a ſtriking reſemblance to the Derbyſhire toad-ſtone: it exiſts, however, in the greateſt plenty in the vicinity of Exeter; and the entire rock on which the caſtle ſtands has been conſidered as volcanic.

Granite, called alſo moor-ſtone, is, as in Cornwall, found in various places, but particularly in Dartmoor, where the mountains commence which extend into that county. It generally lies in vaſt irregular maſſes, and in great variety, as to texture and colour. Specimens of the red granite are exceedingly beautiful when well poliſhed. On expoſure to the atmoſphere, it acquires ſolidity; but when firſt raiſed, may be worked with little difficulty.

The moſt remarkable of the inflammable ſubſtances diſcovered in Devonſhire is the Bovey coal, the origin of which has given riſe to conſiderable diſcuſſion among geologiſts. It is obtained in the extenſive flat called Bovey Heathfield, which appears to have been formerly covered by the tide, and is ſuppoſed to be lower than the level of the ſea. The nature and peculiar properties of this mineral, are fully deſcribed by Mr. Polwhele, in his Hiſtory of Devonſhire.

Pyrites is found in various parts of the county, and frequently appears in globular balls of different ſizes. A great number were met with a few years ago in the ſchiſtus, near Chudleigh, lying at ſome diſtance from each other. Several of them are in the cabinet of P. Raſhleigh, eſq. of Menabilly.

The principal metallic ſubſtances of Devonſhire are the ores of tin, lead, iron, and mangameſe. Gold, ſilver, copper, biſmuth, antimony, and cobalt have alſo been found, but in ſmall quantities. The tin-works were anciently numerous and valuable, but have in a great meaſure been

abandoned; the mines of Cornwall being confiderably more productive: though in the reign of king John, Devonfhire produced greater quantities of tin than that county; its coinage being fet to farm at 100*l.* annually, and that of Cornwall at no more than 100 marks. The importance of its trade in tin is, indeed, manifefted from its ftannary courts, and coinage towns, of which there are four; Plympton, Taviftock, Afhburton, and Chagford. The members of thefe courts have the privilege from time to time, and under the direction of the lord warden, of choofing certain jurats to meet in a general affembly at Crockern Tor, in the midft of Dartmoor, with power to make laws for the regulation of the mines and ftannaries. "There are numberlefs ftream-works on Dartmoor, and in its vicinities," Mr. Polwhele obferves, "which have lain forfaken for ages. In the parifhes of Manaton, King's-Teignton, and Teigngrace, are many old tin-works of this kind, which the inhabitants attribute to that period when wolves and winged ferpents were no ftrangers to the hills or the vallies. The Bovey Heath-field has been worked in the fame manner; and, indeed, all the vallies from the Heath-field to Dartmoor bear the traces of fhoding and ftreaming; which, I doubt not, was either Britifh or Phenician. Lead was alfo familiar to the weftern Britons. That the Danmonians had iron-works is plain from Cæfar, who mentions the *exigua copia* of our iron in the maritime parts: the iron-pits of Blackdown were, I conceive, originally Britifh, and were afterwards worked by the Romans." The lead ore of this county is chiefly of a greyifh blue colour, but of feveral varieties. The potter's or teffellated ore is of a fhining, rectangular, tabulated ftructure, always breaking into cubical granules: another kind is of a flaky, fmooth, gloffy texture, breaking into more ponderous fragments: and a third fort is very clofe grained; fracture, fparkling and uneven, and very rich in filver: the latter variety has been obtained in plenty at the Beer-ferris mines. Some very rich lead ore was difcovered a few years ago near the furface at Comb-martin. Iron-ftone is found in various parts of the county, and in many varieties; but does not appear to be particularly rich in metal. Native filver has been found in different fubftances, and in various forms; granular, filamentous, capillary, arborefcent, and cryftallized. Manganefe is chiefly obtained at Upton Pyne, where it was difcovered about forty years ago. Antimony has been found in feveral places within the three parifhes of Chudleigh, Hennock, and South Bovey. Cobalt, interfperfed with numerous filaments of filver, has been difcovered in confiderable abundance at Sampford.

Mineral waters are very numerous in this county, and are chiefly of the chalybeate kind; though they have not in any particular degree been appropriated to medicinal purpofes. The ftrongeft fprings of this defcription arife at Gubb's Wall, near Cleave; at Bella Marfh, near King's-Teignton; at Ilfington, in the vicinity of Totnefs; at Brook, near Taviftock; and at Bampton: the fpring at the latter place is faid to be more ftrongly impregnated with iron than any other.

Devonfhire abounds with rivers: fome of them flow northward into the Briftol Channel; and others fouthward into the Britifh Channel: being enlarged in their progrefs by innumerable leffer ftreams. The principal are the Taw, the Torridge, the Dart, the Teign, and the Exe: the moft confiderable of the fecondary rivers are the Tavy, the Plym, the Yealm, the Arme or Erme, the Aven, the Otter, the Sid, the Axe, and the Lyn. The Tamar is fometimes included among the Devonfhire rivers, as being equally common to this county as to Cornwall, but is more generally confidered as belonging to the latter from rifing within its limits.

The ancient inhabitants of Devonfhire were the Danmonii. Under the Roman fubjugation, this county was included in the diftrict called Britannia Prima: by the Saxons it was made part of the kingdom of Weffex; and fo continued till the incorporation of the Saxon ftates into one monarchy under Egbert.

Devonfhire is in the diocefe of Exeter, and in the weftern circuit. It is divided into thirty-three hundreds; and contains 40 market towns, 394 parifhes, 61,190 houfes, and 343,000 inhabitants. The members returned to parliament are twenty-fix: two for the county, and two for each of the following places; Exeter, Totnefs, Plymouth, Okhampton, Barnftaple, Plympton, Honiton, Taviftock, Afhburton, Dartmouth, Bere-Alfton and Tiverton. The county pays twenty-one parts of the land tax; and fupplies 1600 men to the militia. The affizes are held at Exeter. Marfhall's Rural Economy of the Weft of England. Polwhele's Hiftory of Devonfhire. Beauties of England and Wales.

DEVONSHIRING in *Agriculture*, a name formerly applied to the procefs of paring and burning.

DEVOTION of *devoto*, from *devoveo*, I confecrate, a fincere, ardent worfhip of God.

Monf. Jurieu defines devotion, a foftening and yielding heart, with an inward confolation, which the fouls of believers feel in the exercifes of piety.

Devotion, according to Dr. Blair (fee Sermon x. vol. i.) is the lively exercife of thofe affections, which we owe to the Supreme Being, comprehending feveral emotions of the heart, which all terminate on the fame great object. The chief of thefe are veneration, gratitude, defire, and refignation. Veneration is an affection compounded of awe and love, and looks up to the Deity, as he is in himfelf:—gratitude for the divine benefits is a warmer emotion than fimple veneration, and regards God as he is towards us:—defire regards the favour of the Supreme Being as its chief good and final reft:—and thefe feveral fentiments and affections produce, and are accompanied by, an entire refignation of the foul to God, as the confummation of truft and hope. Accordingly, devotion expreffes, not fo much the performance of any particular duty, as the fpirit which ought to animate all religious duties. It ftands oppofed, not merely to downright vice; but to a heart which is cold, and infenfible to facred things; which from compulfion, perhaps, and a fenfe of intereft, preferves fome regard to the divine commands, but obeys them without ardour, love, or joy. This excellent preacher obferves, that in the culture and exercife of a devout fpirit, it is of the utmoft confequence to guard againft extremes of every kind in religion; as fuperftition, on the one hand, which attaches men, with immoderate zeal, to the ritual and external part of religion, and enthufiafm, on the other, directing their whole attention to internal emotions, and myftical communications with the fpiritual world: while, neither the one, nor the other, has paid fufficient regard to the great moral duties of the Chriftian life. Some perfons, eagerly anxious to avoid thefe two great abufes of religion, have neglected to obferve, that there are extremes oppofite to each of the former, into which they are in danger of precipitating themfelves. Thus, the horror of fuperftition has fometimes produced contempt for all external inftitutions; as if it were poffible for religion to fubfift in the world, without forms of worfhip, or public acknowledgement of God. Others, well affected in the main to the caufe of goodnefs, obferving that perfons of a devout turn have at times been carried away, by warm affections, into unjuftifiable exceffes, have

have thence haftily concluded, that all devotion was akin to enthufiafm; and feparating religion totally from the heart and affections, have reduced it to a frigid obfervance of what they call the rules of virtue. In order to guard againft this extreme, it fhould be confidered, that true devotion is rational and well-founded; that it is of the higheft importance to every other part of religion and virtue; and alfo, that it is moft conducive to our happinefs. Pure and rational devotion, as our author well obferves, fhould be carefully diftinguifhed from that which is, in any degree, fpurious and adulterated. For this purpofe devotion fhould not be made to confift in the mere performance of any external act of worfhip; nor fhould the pleafures and advantages of it be conceived as open indifcriminately to all; nor fhould it be reprefented as requiring an entire retreat from the world, or as enjoining a total contempt of all the pleafures and enjoyments of human fociety; nor again, fhould it be believed, that devotion nourifhes a fpirit of feverity, in judging of the manners and characters of others; or, that perpetual rapture and fpiritual joy belong to devotion.

Uuder the name of devotions are ufually underftood certain religious practices, which a perfon makes it a rule to difcharge regularly; and with reafon, if this exactitude be founded on folid piety; otherwife it is vanity, or fuperftition.

Devotion, among the Romans, was a fort of facrifice, or ceremony, whereby they confecrated themfelves to the fervice of fome perfon.

The ancients had a notion, that the life of one might be redeemed by the death of another: and hence were thofe devotions fo frequent for the lives of the emperors. Thefe were either private or public; of the former fort were the devotions of the two Decii and of Curtius, who devoted themfelves to fave the Romans. The devotion of Decius, who, after devoting himfelf to his country, threw himfelf into the hands of his enemies, and was killed, is faid to have gained the Romans the victory. On this occafion Decius gave notice to the pontiff Valerius, to pronounce the form of devoting: "Deorum ope," fays he, "Valeri, opus eft; agedum; præi verba quibus me pro legibus devoveam." The public devotions were performed by the dictator or conful, at the head of an army. The form is tranfmitted to us by Macrobius (Sat. l. 3. 9.) and is as follows: "Father Dis, Pluto, Jupiter, Manes, or by whatever name it is lawful to call you, I befeech you to fill this city of Carthage, and the army I mean, with terror and confternation: Grant that they who bear arms againft our legions and army, may be put to the rout, that the inhabitants of their cities, and of their fields, with all that dwell in them, of every age, may be devoted to you, according to the laws, by which our greateft enemies are devoted. I, by the authority of my commiffion, devote them, in name of the Roman people, in name of the army, and in name of our legions, that you may preferve both the commanders and thofe who ferve under them."

But devotion to any particular perfon was not known till Auguftus. The day after the title Auguftus had been given to Octavius, Pacuvius, a tribune of the people, began to fay, he would devote and confecrate himfelf to him, as was practifed among the barbarous nations, to obey him even at the expence of life, if he were commanded. His example was immediately followed by all the reft; and it came at length to be eftablifhed into a cuftom, never to go to falute the emperor, without declaring, they were devoted to him. Auguftus, though feeming to oppofe this vile and infamous flattery, yet rewarded the author.

Cornelius Nepos ufes the word devotion for a kind of punifhment, confifting of direful curfes, and marks of infamy. See Accursed, and Execration.

Whenever the law devoted any one to death, it was permitted to kill him. One of Romulus's laws was conceived in thefe terms: "Si patronus clienti fraudem faxit, facer efto. *i. e.* If any patron defrauds his client, let him be devoted." It was to Pluto or Dis, and the other infernal deities, that criminals were devoted.

DEVOURING, in *Heraldry*. When fifhes are borne in an efcutcheon, in a feeding pofture, the heralds denominate it devouring; becaufe fifhes fwallow all their food whole.

DEUPRAG, in *Geography*, a town in the country of Thibet; 15 miles S. of Sirinagur.

DEVRACOTA, a tract of land on the coaft of Orixa, in the fouthern part of Hindooftan, called the Deccan, which had been ceded to the French Eaft India company by the viceroys of Golconda. It is about 20 miles S. of Mafulipatam, and renowned for its uncommon fertility. Its clear value to the French, before 1754, was 100,000 rupees, or 240,000 French livres *per annum*. Herbin Statiftique de la France, vol. vii.

DEUREN, or Duren, anciently *Marcodurum*, was formerly a town of the duchy of Juliers, in the circle of Weftphalia, in Germany, but is now a town of France, in the department of the Roer, diftrict of Aix-la-Chapelle, fituated on the river Roer, 15 miles S. of Juliers, 30 S. W. of Cologne. E. long. 9°. Lat. 50° 46′. It contains 3489 inhabitants, and is the chief place of a canton, which, in 57 communes, comprifes a population of 16,695 individuals.

DEURIOPUS, in *Ancient Geography*, a country of Macedonia, forming a part of Pæonia; fituated between the rivers Axius and Erigon. Its principal towns were Bryanium, Alalcomenæ, and Stymbara, fuppofed to be the fame with Stubera.

DEUS Dedit, or God's gift, in *Biography*, pope, fucceffor to Boniface IV. in the year 614. He reigned but three years; and we have but few particulars tranfmitted to us refpecting him, farther than that he was a native of Rome, and fon of a fubdeacon of the church, and that his election to the pontificate was unanimous. He was a pious and benevolent man, and to him have been imputed divers miracles. Moreri mentions one in which he healed a leprous man by bringing their mouths in contact. The biographer probably gave little credit to fuch a report, but thought it neceffary to infert it to quiet the minds of the devotees to the Catholic religion. Moreri.

DEUS Vult, *Deus le Volt:* the cry of battle among the Croifaders, in their feveral expeditions into the Eaft for the recovery of the Holy Land. In the council of Clermont, held by pope Urban II, in the year 1096, for inftituting the firft croifade, the whole affembly there prefent, laity, as well as clergy, anfwering his exhortations with a general and fudden cry of *Deus Vult*, It is the will of God, the pontiff reprefented this as the effect of infpiration, and appointed thofe words to be the fignal for attacking and rallying in the enfuing battles againft the Saracens, which they continued to be in all future croifades as well as in the firft. See Croisade.

DEUSINGIUS, Anthony, in *Biography*, a learned phyfician, and voluminous writer on every part of medicine, and on other branches of natural philofophy, was born at Meurs, in the duchy of Juliers, October 16th, 1612. After acquiring a proficiency in the learned languages, to which were added the Arabic and Perfian, he went to Leyden,

den, where he completed his education by taking the degree of doctor in medicine, in 1634. Three years after he was appointed professor in mathematics at Meurs. In 1639, he was called to succeed Isaac Pontanus, in the chair of natural philosophy and mathematics, and, in 1642, to that of medicine at Harderwick, to which was added the office of physician to the city. From Harderwick, he went to Groningen, where, in addition to the offices similar to those he held at Harderwick, he was appointed rector of the university, and ancient of the church. Amid the business which such accumulated duties heaped upon him, he found leisure to write a greater number of treatises on the different parts of medicine and philosophy, than have fallen from the pen of almost any other man. In the list Haller has given, we find the titles of fifty-four treatises, or dissertations. But a small number of these are on practical subjects. Many of them are metaphysical, and a still greater number are controversial. These are written with great acrimony, particularly those relating to his controversy with Silvius, though the subjects, which are mostly physiological, do not seem calculated to excite so much rancour as we see infused into them. A few of the titles follow, for the rest the reader is referred to the different parts of the Bibliotheca of Haller. "Joannes Cloppenburgius, Weautontimorumenos, seu retorsio injuriarum de libello falsidico, cui titulus, Res judicata, cumulatarum," 1643, 4to. The subject of dispute is the nature of the soul, and on the intelligences that direct the course of the stars. "Canticum Avicennæ de Medicina, ex Arab. Lat. reddit," 1649, 4to. "Dissertationes duæ, prior de motu Cordis et Sanguinis, altera de lacte ac nutrimento fœtus in utero," 4to. 1651. In this he defends the circulation of the blood, as described by our countryman Harvey. "Synopsis Medicinæ universalis," 1649., &c. Deusingius died in the winter of 1666, of a pleuritic affection, occasioned by taking a long journey, in very severe weather, to visit the count of Nassau, to whom he was physician. Eloy Dict. Hist.

DEUTEROCANONICAL, compounded of δευτερος, *second*, and κανονικος, *canonical*, in *Biblical History*, an appellation given to certain books of the Holy Scriptures, which were added to the canon after the rest; either because they were not wrote till after the compilation of the canon, or because of some disputes as to their canonical authority.

The Jews, it is certain, acknowledge several books in their canon, which were put there later than the rest. They say, that, under Ezra, a great assembly of their doctors, which they call, by way of eminence, the *great synagogue*, made the collection of the sacred books, which we have now in the Hebrew Old Testament: and they agree, that they put books therein which had not been so before the Babylonish captivity. Such are those of Daniel, Ezekiel, Haggai, &c. and those of Ezra and Nehemiah.

And the Romish church has since added others to the canon that were not, nor could be, in the canon of the Jews; because some of them were not composed till after the canon was formed. Such is the book of Ecclesiasticus; with several of the apocryphal books, as that of the Maccabees, Wisdom, &c. Others were added still later, because their canonical authority had not been yet examined; and, till such examen, and judgment, they might be set aside, at pleasure.

But since that church has pronounced as to the canonical authority of these books, there is no more room now for her members to doubt of them than there was for the Jews to doubt of those of the canon of Ezra: and the deuterocanonical books are, with them, as canonical as the protocanonical; the only difference between them consisting in this, that the canonical authority of the one was not generally known, examined, and settled, so soon as that of the others.

The deuterocanonical books, in the modern canon, are, the book of Esther, either the whole, or at least the seven last chapters of it; the Epistle to the Hebrews; that of James; and that of Jude; the second of St. Peter; the second and third of St. John; and the Revelation. The deuterocanonical parts of books are, the Hymn of the Three Children; the Prayer of Azariah; the histories of Susanna, of Bel and the Dragon; the last chapter of St. Mark; the bloody sweat, and the appearance of the angel, related in St. Luke, chap. xxii. and the history of the adulterous woman in St. John, chap. viii. See CANON and BIBLE.

DEUTERONOMY, one of the sacred books of the Old Testament; being the fifth book of the law, and the last of those written by Moses; closing, according to the computation of Usher, the history of $2552\frac{1}{2}$ years, from the beginning of the world to the death of Moses. The word is Greek, compounded of δευτερος, *second*, and νομος, *law*.

It does not appear that Moses, who seems, from several passages that occur towards the beginning, to have been the author of this book, made any division of what he wrote, into distinct books; or that he gave different names and titles to the different parts of his work; nor do the Jews, even at this day, distinguish them in the copies they use in the synagogues, but write them all running as one single work, without any other distinction beside that of little and great parasches. It is true, in the other copies, used by private persons, they are divided, into five parts, as among us; but they give them no other name but the first word wherewith each division begins; much as we do in quoting a decree, or chapter of the canon law.

Thus the first part of Moses's work they call בראשית *Bereschit*, because it begins with that word; the second, they call ואלה שמות *Veelleh Schemoth*; the third, ויקרא *Vajickra*; the fourth, וידבר *Vajiedabber*; and the fifth, אלה הדברים *Elleh Haddebarim*; which is one of the first words thereof. This custom is very ancient among the rabbins, as appears from the ancient commentaries on those books, called בראשית רבה *Bereschit Rabba*, רבה ואלה שמות *Veelleh Schemoth Rabba*, &c. from the *Prologus Galeatus* of St. Jerom. The Greeks, when they first translated the law, gave the five parts into which it was divided, the names of Genesis, Exodus, Leviticus, Numbers, and Deuteronomy. Accordingly the names are Greek, excepting that of Leviticus, which is Hebrew; and they express what is contained in those books, or at least the most remarkable things contained therein; which is the usual Greek manner of giving titles.

The book of Deuteronomy was so called, because this last part of the work of Moses comprehends a repetition, or recapitulation, which that legislator made to the Israelites, before his death, of the law he had before delivered to them at large: and hence Deuteronomy is still called, by the rabbins, משנה *Mischneh*, *repetition*; משנה תורה *Repetition of the law, second law*, they likewise call it ספ־תוכהות *the Books of Reprimands*; on account of the twenty-eighth chapter, which is full of blessings, promised to such as keep the law; and of curses, threatened to such as transgress it.

The book of Deuteronomy was written in the fortieth year after the delivery from Egypt, in the country of the Moabites beyond Jordan: Moses being then in the 120th year of his age; or in the last year of his life. It contains, in Hebrew,

Hebrew, eleven parafches, though only ten in the editions of the rabbins at Venice; twenty chapters and 955 verfes. In the Greek, Latin, and other verfions, it contains thirty-four chapters: the laft was not written by Mofes, becaufe it contains a relation of his death and burial. Some fay it was added by Jofhua, immediately after Mofes's death; others will have it added by Ezra, which is the moft probable opinion; who likewife made fome interpolations in the book itfelf, as chap. ii. ver. 12. chap. iii. 11. and 14. Eichorn, in his "Introduction to the Old Teftament," publifhed at Leipzig, in four volumes, 1787—1795, confiders this book as the work of another and later perfon than Mofes, who had furvived feveral of thofe leaders of the people, who had been educated in the fchools of the prophets. Dr. Kennicott, in his "State of the printed Hebrew Text of the Old Teftament, &c." (vol. i.) has pointed out feveral alterations and interpolations in this book; and reftored the true reading, particularly in chap. xxxiii. 1—5. See PENTATEUCH.

DEUTEROPOTMI, Δευτεροποτμοι, from δευτερος, *fecundus*, and ποτμος, *fortuna*, or *mors*, among the Athenians, a defignation given to one who had been thought dead, and after the celebration of the funeral rites, unexpectedly recovered. It was unlawful for the deuteropotmi to enter into the temple of the Eumenides, or to be admitted to the holy rites, till after they were purified by being let through the lap of a woman's gown, that they might feem to be new born. Pott. Archæol. Græc. tom. i. lib. ii. cap. 4. p. 223.

DEUTEROSIS, the Greek name by which the Jews called their mifchna, or fecond law. Deuterofis in Greek has the fame fignification almoft as mifchna in Hebrew; both fignify an iteration. Eufebius accufes the Jews with corrupting the true fenfe of Scripture with the trifling explanation of their deuterofes. Calmet, Dict. Bibl. in voc.

DEUTICHEM, or DEUTIKEM, in *Geography*, a fmall town of Holland, in the department of Gueldre, on the Old Yffel, famous for a confiderable iron foundery.

DEUTSCH, NICHOLAS MANUEL, in *Biography*, an eminent artift, was a native of Berne, in Switzerland, and flourifhed in 1518. He is mentioned as a celebrated painter in his time. He alfo cut on wood feveral of his own defigns in a bold and free, but flight ftyle; and the naked parts of his figures are fometimes incorrect. The two following prints of this artift are mentioned by Strutt; *viz.* "A woman ftanding," a middling fize upright print, and "Several women figures in a compofition;" alfo a middling-fized print, lengthways. To the initials of his name and a dagger, is added the date 1518. This, fays Strutt, is one of his neateft and beft engravings.

DEUTSCH EYLAU, in *Geography*. See EYLAU.

DEUTSCHBROD, *Broda Germanica*, in the Bohemian language *Brod Niemeczky*, is an ancient town of Bohemia, in the circle of Czaflaw. It is called Deutfch, or German Brod, in contradiftinction to Brod, or Bohemian Brod, a town in the circle of Kaurzim, in the neighbourhood of which the Huffites fuffered a confiderable defeat in the year 1434.

DEUTZIA, in *Botany*, (in honour of prefident John Deutz, one of the magiftrates of Amfterdam, a patron of Thunberg, who promoted and contributed to the expences of his botanical expedition to Japan.) Thunb. Nov. Gen. fafc. 1. 19. ic. Jap. 10. Linn. Syft. Veg. ed. 14. 425. Schreb. 305. Willd. Sp. Pl. v. 2. 730. Juff. 431. Clafs and order, *Decandria Trigynia*. Nat. Ord. probably *Saxifragæ* of Juff.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, fomewhat bell-fhaped, three times fhorter than the petals, downy, with five, rarely fix, ovate, obtufe, upright, deciduous teeth. *Cor.* Petals five, rarely fix, inferted into the rim of the calyx, oblong, obtufe, undivided, entire. *Stam.* Filaments ten, inferted into the rim of the calyx, alternately fhorter than the corolla, linear, with three teeth at the fummit, of which the middle one is awl-fhaped and bears the anther; anther globofe, of two lobes and two cells. *Pift.* Germen inferior, globofe, crowned with a prominent border; ftyles three, rarely four, fpreading, thread-fhaped, the length of the ftamens; ftigmas obtufe. *Peric.* Capfule globofe, truncate, the fize of a fmall pea, perforated, hard, rough, fomewhat three-cornered, crowned with the hardened fpreading bafes of the ftyles; internally of three valves, and three, rarely four, cells, burfting finally at the bafe. *Seeds* feveral in each cell.

Eff. Ch. Calyx bell-fhaped, five-cleft. Petals five. Filaments with three points. Capfule of three cells, crowned with the permanent ftyles, burfting at its bafe.

Sp. D. *fcabra*. Thunb. Jap. 185. t. 24. Willd. Sp. Pl. v. 2. 730. (Joro; Kæmpf. Amæn. 854.) Found in the mountains of Japan, flowering in May and June. It forms a fmall branching tree like elder, with round, flender, purplifh, fomewhat hoary branches. Leaves oppofite, moftly ftalked, fimple, ovate, acute, ferrated, veiny, very rough on both fides with minute ftarry briftles. Buds of feveral ovate, hoary, permanent fcales. Stipulas none. Flowers in terminal hoary panicles, white, the fize of thofe of the common lime tree.

Kæmpfer fays the wood is hard, tough, and fmooth, ufed for making cabinets and very fine bodkins; and that the inner bark, which is green and very bitter, enters into the compofition of plafters. Thunberg informs us that the leaves are ufed for polifhing the articles made of the wood.

DEVUIDER, in the *Manege*, is applied to a horfe, that, upon working upon volts, makes his fhoulders go too faft for the croup to follow; fo that inftead of going upon two treads, as he ought, he endeavours to go only upon one. This comes from the refiftance he makes in defending againft the heels; or from the fault of the horfe-man, who is too hafty with his hand. See HASTE.

DEUX-PONTS, in German *Zweybrück*, in Latin *Bipontium*, in *Geography*, was formerly the capital of the German duchy of the fame name, in the circle of the Upper Rhine, which, at the peace of Luneville, was ceded to the French, together with feveral other countries fituated on the weftern fhore of the Rhine. It conftituted at that time part of the dominions of the elector, now king of Bavaria.

Deux-Ponts at prefent is a town of France, in the department of Mont Tonnere, chief place of a diftrict of the fame name, fituated on the river Erlbach, 45 miles S. W. of Worms, 66 N. by W. of Strafburg, 57 N. E. of Metz, 63 S. W. of Mayence, N. lat. 49° 20′. It has a fub-prefect, a court of juftice, and a regifter office. Its canton contains only 3 communes, and 5532 inhabitants, 4976 of whom belong to the town itfelf.

The foil of the diftrict of Deux-Ponts is mountainous and not very fertile, yet it produces fufficient food for its inhabitants. Madders and potatoes thrive well; the paftures are excellent; there is much wood, and game in plenty. The vine grows along the banks of the river Glane. There are iron, copper, and coal mines, and a mine of agate, which contains ftones as precious as any of the Indian agates. They are ufed for fnuff-boxes, rings, feals, fleeve-buttons, &c. Contwig has a fteel manufactory, and Hombourg a manufacture of muflin.

The

The diſtrict of Deux-Ponts counts nine cantons, 154 communes, and 55,568 inhabitants, upon a territorial extent of 1795 kiliometres.

DEW, Deaƿ, *ros;* water depoſited by the atmoſphere in conſequence of ſimple cooling, commonly by night, and in drops too ſmall to be viſible, until collected on the leaves of plants and other objects.

Caſaubon derives the word from the Greek δευω, which is ſtrictly *I dew;* the ω being the perſonal pronoun ſuffixed by contraction. It is quite as probable, nevertheleſs, that a ſubſtantive, anſwering to our Angloſaxon primitive, gave riſe to this verb in the Greek.

Dew is a phenomenon proper to clear weather. It begins to be depoſited about ſun-ſet, is moſt conſtant in vallies and on plains, near rivers, and other collections of water; and abounds on thoſe parts of the ſurface which are clothed with vegetation. It is often ſuſpended when rain is approaching, as likewiſe in windy weather, and before thunder ſtorms: an unuſually copious depoſition, however, ſometimes precedes rain. In general it does not fall when a cloſe veil of clouds, however ſlight, remains over the ſky after ſun-ſet. Its approach, in the extenſive valley watered by the Thames, preſents the following appearance. After a clear warm day there is gradually formed on the horizon a continuous haze, riſing ſometimes to a conſiderable height, and often tinged by the ſetting ſun with a fine gradation of red and violet ſhades. This is the precipitated water, become faintly viſible in its deſcent. Dew is always to be found on the graſs by the time that this haze has become conſpicuous, and its abundance is proportioned to the denſity and permanence of the latter.

The quantity of dew, thus depoſited, differs conſiderably at different places, and at different ſeaſons in the ſame place; nor does it fall upon bodies of every kind indiſcriminately. In explanation of theſe phenomena, ſeveral hypotheſes have been ſuggeſted, but no ſatisfactory theory has as yet been eſtabliſhed reſpecting them. We ſhall endeavour to give our readers a clear idea of the ſubject, by ſtating whatever belongs to it in the following order. We ſhall, in the firſt place, deſcribe the facts which have been aſcertained by means of experiments and obſervations; ſecondly, we ſhall briefly mention the principal hypotheſes that have been offered for their explanation; and, laſtly, we ſhall ſubjoin ſome accounts of peculiar occurrences, which ſeem to belong to the preſent article.

1. In this iſland the dew is obſerved (like the drops of a miſling rain upon the leaves of graſs and other vegetables, upon wood, glaſs, porcelain, &c., or upon the earth, which is thereby frequently rendered ſenſibly moiſt,) more copiouſly in ſpring and ſummer mornings; than at other times of the year. In autumn, however, and even in winter, it frequently happens, under the concurrence of particular circumſtances, that an abundant dew is depoſited in the courſe of the night.

2. In countries ſituated nearer to the equator, the dews are generally obſerved in the morning throughout the whole year; and in ſome places they are ſo very copious, as in great meaſure to ſupply the deficiency of rain, which ſeldom falls in thoſe places. But the quantity of theſe effects is not entirely proportional to the latitude, other local circumſtances concurring to their production.

3. The condenſation of the vapour which forms the dew moſtly takes place whilſt the ſun is below the horizon; but no particular experiments have been inſtituted for the purpoſe of determining whether the condenſation goes on regularly during the night, or alters its rate with any particular law. It has, however, been obſerved, that in moſt countries a conſiderable depoſition of moiſture takes place not long after the ſetting of the ſun; but ſoon after the depoſition proceeds with a ſlackening pace, until the riſing of the ſun in the morning. But the regularity of theſe effects is frequently counteracted by accidental circumſtances; ſuch as the change of wind, the preſence of clouds, &c.

4. In cloudy weather there is little or no dew depoſited. The greateſt quantity of it is obſerved in a morning ſubſequent to a clear, ſtill, and cool night, which has followed a pretty warm day.

5. Mr. Du Fay, at Paris, placed two ladders againſt one another, meeting at their upper ends, and ſpreading wide aſunder below. Their height was 32 feet. To the ſeveral ſteps of theſe he faſtened large panes of glaſs, ſo diſpoſed as not to overſhade one another. With this apparatus expoſed to the ambient air, he found that the lower ſurface of the loweſt pane of glaſs was firſt wetted with dew, then its upper ſurface, then the lower ſurface of the pane next above it was wetted, and ſo on, until all the panes to the very top of the ladders became covered with dew. He alſo tried the experiment with pieces of cloth inſtead of panes of glaſs, and the reſult was ſimilar to the above. He weighed all the pieces of cloth on the morning following their expoſure, and found that thoſe which had been placed lowermoſt, had imbibed more moiſture than thoſe which had been ſituated higher up; he owns, however, that the reſult of this experiment did not prove ſo ſatisfactory as the preceding. In general the lower parts of bodies that are expoſed to the ambient air, are firſt covered with dew.

6. Muſchenbroeck repeated the above-mentioned experiments of Du Fay, with this difference however, *viz.* that he placed the ladders, &c. upon a plane covered with ſheet lead, but the experiment was attended with the like reſult.

7. By ſhaking the leaves of plants that are covered with dew, or by expoſing glaſs veſſels, or otherwiſe, the dew water may be collected, and on examination it will be found to be a pretty pure water; unleſs duſt and other accidental impurities happen to be gathered with the dew water. Some particular caſes are recorded, in which the dew was found to differ conſiderably from pure water; but thoſe accounts will be noticed hereafter.

8. The moſt ſingular phenomenon which attends this aqueous condenſation is, that the dew is not depoſited upon all kinds of ſubſtances indiſcriminately; it falls upon certain bodies much more abundantly than upon others, and upon ſome even not at all. Alſo, the very ſame bodies have been found to receive the dew in a greater or leſs degree, or not at all, according to certain circumſtances. Theſe anomalous effects not appearing at preſent reconcileable to any ſatisfactory theory, it is incumbent upon us to ſtate the principal reſults of the experiments that have been made on purpoſe by various philoſophers, in order that the ingenious reader may form whatever opinion he thinks beſt upon the ſubject.

9. The drops of dew attach themſelves to glaſs, cryſtals, and porcelain, much more readily than to other bodies; next to thoſe come the leaves of vegetables, wood, eſpecially when varniſhed, and common earthen-ware; but the dew adheres leaſt of all to all ſorts of metallic bodies.

10. Muſchenbroeck obſerved that on a leaden gutter, dew condenſed on every kind of ſubſtance, and ſo it did on a table in a certain garden. The forty-ſecond volume of the Philoſophical Tranſactions, page 112, contains ſome obſervations on dew, made by Dr. L. Stocke, upon the leaded platform of a tower. He expoſed ſeveral ſubſtances, and found, upon the whole, that the dew fell plentifully upon glaſſes of various kinds; it fell leſs copiouſly upon certain pieces of wood, and leaſt of all upon metals, excepting, however, ſuch as were

rough;

rough; for he found that much dew fell upon what he calls *ferrum aſperum*, and *plumbum aſperum*. None fell upon ruſty iron.

11. Mr. Du Fay, at Paris, made the following experiments. He placed a china ſaucer in the middle of a ſilver plate, and adjoining to it he placed a china plate, having in its middle a ſilver diſh, much reſembling the above-mentioned ſaucer. All this he expoſed to the ambient air, and found that the china ſaucer was covered with dew, whilſt the ſilver plate, which extended four inches round it, was not moiſtened in the leaſt. Alſo the china plate was covered with a conſiderable quantity of dew, whilſt the ſilver diſh in the middle of it was quite dry.

12. Mr. Du Fay, in order to determine whether the nature of the body upon which the veſſel was placed to receive the dew had any influence in the effect, employed two equal watch glaſſes, one of which he placed, with its concavity uppermoſt, upon a ſilver plate; and placed the other in a ſimilar manner upon a china plate. The firſt of theſe glaſſes was ſurrounded with a ſilver ferril, the object of which was to prevent any adheſion of dew to its convex ſurface, which faced the ſilver plate. This apparatus having been expoſed for ſeveral ſucceſſive nights, he conſtantly found five or ſix times more dew in the watch glaſs, which ſtood upon the china plate, than in that which ſtood upon ſilver. He alſo obſerved, that in the latter, the ſmall quantity of dew ſtood principally about the centre, in the form of ſmall drops, which diminiſhed in ſize as their ſituation was more remote from the centre, and left a border of about half an inch, quite dry all round the edge of the glaſs.

13. Dr. Watſon, biſhop of Landaff, relates ſome experiments performed by himſelf, the reſult of which coincides with that of the preceding paragraph. "By means," he ſays, "of a little bees-wax, I faſtened a half-crown very near, but not quite contiguous, to the ſide of the glaſs; and, ſetting the glaſs with its mouth downwards on the graſs, it preſently became covered with vapour, except that part of it which was next the half-crown. Not only the half-crown itſelf was free from vapour, but it had hindered any from ſettling on the glaſs which was near it; for there was a little ring of glaſs ſurrounding the half-crown, to the diſtance of a quarter of an inch, which was quite dry, as well as that part of the glaſs which was immediately under the half-crown; it ſeemed as if the ſilver had repelled the water to that diſtance. A large red wafer had the ſame effect as the half-crown; it was neither wetted itſelf, nor was the ring of glaſs contiguous to it wetted. A circle of white paper produced the ſame effect, ſo did ſeveral other ſubſtances, which it would be too tedious to enumerate."

14. A much more extenſive ſeries of experiments on this ſubject, the reſult of which is highly deſerving of attention, was a few years ago inſtituted by Mr. Prevoſt; and a ſummary of which is as follows. He found that when plates of metal (which he calls armours) are fixed on pieces of glaſs, it ſometimes happens that they are as much covered with dew as the glaſs itſelf; but more frequently they remain dry, and in this caſe they are alſo ſurrounded by a dry zone. But when the other ſide of the glaſs is expoſed to dew, the part which is oppoſite to the metal remains perfectly dry. If the metal be again covered with glaſs, it will loſe its effect in preventing the depoſition.

15. Theſe experiments may be very conveniently made on the glaſſes of a window, when moiſture is attaching itſelf to either of its ſurfaces. Mr. Prevoſt remarks that it often happens that dew is depoſited externally, even when the air within is warmer than without. A plate of metal fixed internally on a window, receives a larger quantity of moiſture than the glaſs, while the ſpace oppoſite to an external plate remains dry; and if the humidity is depoſited from without, the place oppoſite the internal plate is alſo more moiſtened, while the external plate remains dry; and both theſe circumſtances may happen at once with the ſame reſult. A ſmall plate fixed externally, oppoſite to the middle of the internal plate, protects this part of the plate from receiving moiſture, and a ſmaller piece of glaſs fixed on the external plate, produces again a central ſpot of moiſture on the internal one; and the ſame changes may be continued for a number of alternations, until the whole thickneſs exceeds half an inch.

16. Gilt paper, with its metallic ſurface expoſed, acts as a metal; but when the paper only is expoſed, it has no effect.

17. When a plate of metal, on which moiſture would have been depoſited, is fixed at a ſmall diſtance from the glaſs, the moiſture is transferred to the ſurface of the glaſs immediately under it, without affecting the metal. If this plate is varniſhed on the ſurface remote from the glaſs, the effect remains, but if on the ſide next the glaſs, it is deſtroyed.

18. The oxydation of metals renders them alſo unfit for the experiment. When glaſſes, partly filled with mercury, or even with water, are expoſed to the dew, the latter is depoſited only on the parts which are above the ſurface of the fluid. But in all caſes when the humidity is too copious, the reſults are confuſed.

19. In order to reduce theſe facts to ſome general law, Mr. Prevoſt obſerves, that when the metal is placed on the warmer ſide of the glaſs, the humidity is depoſited more copiouſly either on itſelf, or on either ſurface of the glaſs in its neighbourhood; but that when it is on the colder ſide, it neither receives humidity, nor permits its depoſition on the glaſs. That a coat of glaſs or varniſh deſtroys the efficacy of the metal, but that an additional plate of metal reſtores it.

20. The quantity of water which falls upon the ſurface of the earth in the form of dew, has by no means been aſcertained either in this country or elſewhere; nor does it appear eaſy to deviſe means of aſcertaining it. Dr. Hales relates ſome experiments he made with a view of determining the quantity of dew which falls in the night. For this purpoſe, Aug. 15, 7 P. M. he filled two glazed earthen pans, three inches deep, and twelve inches diameter in ſurface, with moiſt earth: and he obſerves, that the moiſter the earth, the more dew falls on it in a night; and that more than a double quantity of dew falls on a ſurface of water, than on an equal ſurface of moiſt earth. Theſe pans increaſed in weight by the night's dew 180 grains; and decreaſed in weight by the evaporation of the day, 1 ounce, 282 grains; ſo that 540 grains more are evaporated from the earth every 24 hours in ſummer, than the dew that falls in the night; *i. e.* in 21 days near 26 ounces from a circular area of a foot diameter. If 180 grains of dew, falling in a night on ſuch an area, which is equal to 113 ſquare inches, be equally ſpread on the ſurface, its depth will be $\frac{1}{159}$th part of an inch, $= \frac{180}{113 \times 254}$. He likewiſe found the depth of dew in a winter's night to be the $\frac{1}{90}$th part of an inch. If, therefore, we allow 159 nights for the extent of the ſummer's dew, it will in that time ariſe to one inch depth; and reckoning the remaining 206 nights for the extent of the winter's dew, it will produce 2.28 inches deep; and the dew of the whole year will amount to 3.28 inches depth. But the quantity, which evaporated in a fair ſummer's day from the ſame ſurface,

being 1 ounce and 282 grains, gives $\frac{1}{70}$th part of an inch depth for evaporation, which is four times as much as fell at night. Dr. Hales obferves, that the evaporation of a winter's day is nearly the fame as in a fummer's day; the earth's greater moifture in winter anfwering to the fun's greater heat in fummer. Hales's Vegetable Statics, vol. i. p. 52, &c. ed. 4th.

Mr. Dalton (Manchefter Mem. vol. v.) confiders it as probable, that the dew which is depofited on grafs is much more copious than that which falls upon moift earth, becaufe grafs expofes a much ampler furface in a given acre of ground; hence, he is led to conclude, that if we take the quantity of dew at five inches annually, it will probably not be much over-rated.

Such are the moft authentic facts which have been obferved relative to dew. We muft now proceed to ftate the theories that have been offered for their explanation; and in the courfe of this ftatement, we fhall refer to the preceding facts, by expreffing the numbers of the paragraphs in which they are defcribed.

The obvious, and, upon the whole, the true reafon of the formation of the dew is, that part of the vapours which have been raifed in the courfe of the day by the heat of the fun, and remain floating in the air, are condenfed by the cold of the night, and fettle upon different bodies; but the various peculiarities, which have been enumerated above, evidently fhew that this is not the only caufe of, or the only circumftance concerned in, the formation of dew. The readinefs with which dew falls upon glafs, porcelain, and a few other bodies that are non-conductors of electricity, and the difficulty with which it attaches itfelf to metallic bodies, which are the beft conductors of electricity; has given reafon to fufpect that electricity is concerned in the production of the phenomenon. And, indeed, this opinion is corroborated by the fact which is at prefent well known and eftablifhed; namely, that vapour contains a great deal more of electricity than the water from which it originated; fo that when water affumes the form of vapour, it abforbs a confiderable quantity of electricity which it takes from the furrounding bodies; and when, on the other hand, vapour affumes the form of water, it depofits that additional quantity of electricity upon the furrounding bodies. But the converfion of water into vapours is likewife attended with a confiderable abforption of caloric, and the converfion of vapour into water is attended with a confiderable depofition of calric. In addition to this, it muft be recollected, that certain bodies are much better conductors of heat than others, and, in general, the beft conductors of heat are likewife the beft conductors of electricity. Hence, it feems more than probable, that the formation of dew, with all its peculiarities, depends not upon one, but upon diverfe caufes, which tend to vary the effects according as any one of them happens to predominate.

A difpute of confiderable intereft took place fome years ago between Mr. Du Fay and Mr. Mufchenbroeck, refpecting the origin of dew; *viz.* whether it was formed from vapours afcending from the earth during the night, or from the defcent of fuch as had been raifed in the courfe of the day. Du Fay, who maintained the former opinion, alleging his experiment with the ladders (§ 5.) as an unanfwerable proof of his affertion; whilft Mufchenbroeck, who had repeated that experiment upon a plane covered with fheet lead (§ 6.), formed the contrary conclufion; becaufe, he faid, the vapour could not be fuppofed to come from the ground through the lead. To this, however, Du Fay replied, that the vapour arofe not from that precife fpot which was covered with lead, but from the adjoining ground; and that the continual fluctuation of the air eafily carried it, in its afcent, to the panes of glafs on the ladders.

Independently of thefe equivocal experiments, a proper attention to the fubject will eafily fhew, that the dew is a depofition of water evaporated during the heat of the day, and, under certain circumftances, the evaporation may continue fome time after the fetting of the fun. Thus, when the moift ground, or the waters of rivers, ponds, &c. have been much heated in the courfe of the day, vapour will ftill continue to rife from them during the firft part of the night; and it is owing to this that a fog is frequently feen upon the furface of the water, or of the ground towards the evening of a hot day; for the water, or ground, remaining warm, continues to yield vapours, and thefe are partially condenfed by the coolnefs of the ambient air.

In the confideration of thefe particulars, it will be ufeful to notice Mr. Dalton's obfervations, who, having had occafion to make feveral experiments on the fubject of aqueous vapour, was thereby induced to form the following probable conclufions:

1. "That aqueous vapour is an elaftic fluid *fui generis*, diffufible in the atmofphere, but forming no chemical combination with it."

2. "That temperature alone limits the maximum of vapour in the atmofphere."

3. "That there exifts at all times, and in all places, a quantity of aqueous vapour in the atmofphere, variable according to circumftances."

4. "That whatever quantity of aqueous vapour may exift in the atmofphere at any time, a certain temperature may be found, below which a portion of that vapour would unavoidably fall, or be depofited, in the form of rain or dew, but above which no fuch diminution could take place, chemical agency apart. This point may be called the *extreme temperature* of vapour of that denfity."

5. "And that whenever any body colder than the extreme temperature of the exifting vapour is fituated in the atmofphere, dew is depofited upon it, the quantity of which varies as the furface of the body and the degree of cold below the extreme temperature."

N. B. "The *extreme* temperature of vapour in the atmofphere varies all the way from the *actual* temperature of the atmofphere to 10, 15, 20, or more degrees below it. The point may generally be found in the hotteft months, by pouring cold fpring water into a dry and clean glafs, and marking what degree of cold is fufficient to produce a dew on the outfide of the glafs; at other times frigorific faline folutions may be ufed."

The property, which certain furfaces poffefs, of reflecting, or of emitting, heat with much more readinefs than others, as lately fhewn by Mr. Leflie's interefting experiments; may, when duly examined, be found fufficient to explain feveral of the phenomena of dew, and efpecially thofe which relate to its adhering to certain bodies in preference to others; but for this, fee the article *Radiant* HEAT.

Independently of the interference of heat, the action of electricity, as we have already obferved, feems to be in great meafure concerned in the production of thefe phenomena; yet Mr. Prevoft, who has lately beftowed a good deal of attention on this fubject, difbelieving the interference of electricity, has advanced a new and peculiar theory concerning the phenomena of dew; which depends on the action of heat only. He, in the firft place, ftates the bafes or the axioms upon which he eftablifhes his reafoning, and then proceeds with the explanation. And all this we fhall now fubjoin in his words.

Bases of the Explanation.

1. "The lefs the temperature of glafs is elevated, the more humidity it attracts from the air."

2. "Metals attract it very little."

3. "Glafs fenfibly exercifes its action on the humidity of the air, at a diftance, and notwithftanding the interpofition of different bodies, fuch as plates of metal, &c."

4. "Metals give to glafs, near which they are placed, the property of more fpeedily attracting caloric from hot air, and on the contrary, that of yielding it more fpeedily to cold air."

N.B. "When I fay that metals give glafs this property, I mean that *they act as if they gave it;* which is evident by an examination of two thermometers, one of mercury, the other of alcohol, which are plunged at the fame time in air either colder or warmer than that whofe temperature they indicate. The metallic thermometer arrives much fooner than the other to that of the new medium. Its glafs then, if colder, muft take up more fpeedily from the medium the caloric which it tranfmits to the metal, or, if hotter, it muft more fpeedily give out that of the metal. This being premifed, it is eafy to comprehend that," "when the glafs is armed on its warm face (§ 19.), it yields its caloric to the cold air more fpeedily than that which is not armed (bafis 4.), and, confequently, it attracts humidity more powerfully (bafis 1.), whether directly on the glafs, or through the metal, or on the metal itfelf (bafis 3.), if this be in contact; but if it be at the diftance of fome millimetres, the humidity not meeting the metal on its paffage, accumulates on the oppofite glafs in a greater quantity than elfewhere."

"If the metal be applied on the cold fide (§ 19.), the glafs moft heated does not attract fo much humidity (bafes 4 and 1.), and it accumulates on the unarmed part of the pane."

"If, in this cafe, the armour be covered with a plate of glafs, the plate cools more fpeedily than if the metal were not prefent; but as the partition is more heated than if it were not prefent, there is no effect, and the totality of the double glafs armed within, is in the fame cafe with that unarmed; it, therefore, accumulates neither more nor lefs humidity."

"A fecond armour on the plate of glafs will caufe the phenomena to re-appear (§ 19.); and a fecond plate of glafs on this new armour will again make them difappear, &c. (§ 15.) For, as long as the fymmetrical glafs fhall have the interior armours, the caufes of heat and cold will be found in equilibrio; but an additional armour will neceffarily deftroy the balance, and the heated glafs will not attract humidity."

"If the glafs be armed on both fides (§ 15.), as it would not then be expofed to the air, either on the cold or warm fide, it feems that it ought to attract as much humidity on the armours, as on the reft of the partition. But though the glafs exercifes its action through the metal, this is, neverthelefs, an obftacle which diminifhes its force; humidity, in this cafe, will not then be fo ftrongly attracted by the doubly armed glafs, as by the part perfectly unarmed, &c."

Mr. Prevoft concludes with faying, "Thefe obfervations are not only interefting, but they appear to eftablifh an important point in philofophy; namely, that glafs exercifes its attraction for the humidity (which has a tendency to be depofited from the air) through metals."

The French have, in common language, two different terms whereby to exprefs the evening and morning dew, calling the one *ferein,* the other *rofée*; and, whether mifled by this peculiar nomenclature, or guided by more accurate obfervation, a modern chemift, C. A. Prieur, gives a very different account of the matter. "I was well aware," fays he, fpeaking of the circumftances which led him to inveftigate the fubject, "that the moifture depofited on bodies, foon after fun-fet, is not the fame with that which we find on them again at fun-rife. There is *confequently* an interruption in the phenomenon, an evaporation of the *ferein,* or evening dew, and a new production in the morning. It is ufual to explain the evening dew, by faying that the air, being then cooled, can no longer retain the water it has diffolved in the day. But whence arifes the breeze, which conftantly blows from the fun's place, during the precipitation of this water; and why does that luminary, in re-appearing on the horizon, give occafion to a ftill ftronger breeze, to a greater degree of cold, and a more abundant production of dew?" (Annales de Chimie, tom. 28. p. 317.) Some important points of fact, thus taken for granted, this philofopher proceeds to give a theory of the dew, confidered generally, and with refpect to the whole furface of the earth, of which we fhall briefly ftate the fubftance.

If the earth were deprived of its diurnal motion, and thus expofed to the action of the fun, the following might be conceived to be the effects of that action, in relation to the prefent fubject. A large fpace, immediately beneath the fun, would be fubject to continued evaporation, fo long as there remained any water to be dried up. The air, charged with water, would pafs off above in all directions, towards the fixed horizon, or the boundary between the light and dark fides of the globe; while its place would be fupplied by frefh air flowing in beneath. In proportion as the vapourized air became cooler, in receding from the fun, it would let fall its water in the form of dew. There would, confequently, be a certain zone, or tract of the furface, perpetually fubjected to the fall of dew, brought by a wind coming from the fun. There would alfo be a fpace turned directly towards the fun, where dew would never fall, becaufe of the conftant evaporation; and another fpace, turned directly from the fun, to which it would never reach from the heated fpace, and in which evaporation could never take place to produce it. By combining this fuppofed circulation of the air with the actual ftate of things, in other refpects, Prieur attempts to fhew why the fall of dew in the evening is accompanied with a wefterly breeze, and ceafes before midnight; why the depofition is renewed in the morning with a wind from the eaftward; and why dew falls more copioufly at fun-rife than at fun-fet; and beneath the torrid zone, than in the neighbourhood of the poles. He affirms, on this point, that in Egypt, in Afiatic Turkey, at the Antilles, and in Mexico, the morning and evening dews wet the bodies expofed to them, as effectually as a fhower of rain; which, however, commonly happens in many parts of England. This hypothefis, though undoubtedly more ingenious than folid, ought to have led to a more accurate examination of the truth of the fuppofitions on which it is founded. On the continent of Europe there may be fituations in which the phenomena, affumed by Prieur, are more conftant and diftinguifhable than in Britain, where we do not find that their occurrence has been fufficiently marked.

The production of dew is admitted, on all fides, to be a confequence of the nocturnal refrigeration of the atmofphere. Now it is a fact eftablifhed, by the obfervations of different meteorologifts, that this refrigeration, after a clear day, begins near the furface of the earth, and proceeds upward. Yet it fhould feem that the caloric efcapes, not into the earth, but into the fuperior atmofphere: for the effect is fometimes carried on to a much lower temperature than that of the earth's furface; and the denfe clouds, which have

have fubfifted through the heat of the day, very commonly, in fair weather, break up and evaporate in the evening, at the time that dew is forming below; fhewing that the region in which they are placed is growing warmer. Such, then, being the law of the nocturnal refrigeration, it follows that the loweft ftratum of the atmofphere, feated over waters and in vallies, ought to be the firft to part with its excefs of water. When the air about funfet is very calm, the progrefs of the precipitation upwards may be fo gradual as to admit of a definite boundary; fo that, at a certain height from the ground, there fhall be already fmall drops floating in the air, and attaching themfelves to the bodies near them, while at only a foot higher, the vapour has not yet begun to be decompofed. This may ferve to account for the facts ftated by Du Fay. At the fame time, when the cooling has proceeded fo far, as to affect a confiderable portion of the atmofphere, it cannot be doubted that the drops may defcend at certain times, and in certain fituations, from a height even of fome hundred feet; as may be concluded from the appearance of the haze we have mentioned.

According to the hypothefis of Prieur, dew ought to fall over the whole furface, without regard to hill or valley. By the explanation above given, it ought to be rare on the hills, which is the fact; for the difference between the diurnal and nocturnal temperature is there neither fo confiderable, nor fo fuddenly produced: indeed they are fubject, if of great height, to the effect of the heat afcending from the vallies into the atmofphere around them, as above defcribed.

The name of dew has likewife been applied to other things, which either feem to have been depofited from the atmofphere upon terreftrial bodies at particular times, or may have fome diftant connection with the common dew.

It is recorded in one of the firft numbers of the Philofophical Tranfactions, that in the year 1695, there fell in Ireland, and particularly in the provinces of Leinfter and Munfter, during a great part of the winter and fpring, a fatty fubftance, fomewhat like butter, inftead of the ufual dew. This fubftance is faid to have been of a dark yellow colour, and felt clammy, whence the natives called it *dew-butter*. It fell in the courfe of the night on the moorifh low grounds; and it was found, in the morning, attached to the leaves of grafs, to the thatches of houfes, &c. in the form of pretty large lumps, and it is added, that it feldom fell twice in the fame place. It had an offenfive fmell, like that of a church-yard; yet it lay upon the ground a fortnight before it changed colour, after which it dried up and became black; but it never bred worms, nor did it prove noxious to cattle that fed in the fields where it fell. During the winter of the above-mentioned year, fome very ftinking fogs were obferved on the fame places where the *dew-butter* fell.

During a great part of the year 1783, (in which the repeated earthquakes of Calabria and Sicily deftroyed almoft the whole of the former and a great part of the latter place; when a very large meteor was obferved in the month of September by moft European countries, and when the Hecla in Ireland made a vaft eruption of ignited matter) it is faid that many perfons obferved a peculiar kind of clamminefs upon the leaves of trees, as if a dew of a glutinous nature had been depofited from the atmofphere; but we do not find that any particular experiments were made for the purpofe of afcertaining the nature of it.

The May-dew acquired confiderable celebrity amongft the learned perfons of a century or two ago, and many wonderful properties are attributed to it, and efpecially to a fpirit which is faid to be obtainable from it. But it is needlefs to recite particulars, claiming little or no credit. See Phil. Tranf for May 1665.

Dew, *Honey*. This is a fweet vifcid liquor, found fometimes in great abundance on the hazel, the lime, the elm, &c. and on fruit trees. Some have fuppofed it a depofition from the atmofphere, as is evident by the name of dew being given to it: others have thought it the juice of the plant, fecreted in confequence of an injury, fuftained by fudden changes in the air. To afcertain its real origin, we have only to fearch the under-furface of the leaves, immediately over thofe on which it appears. They will be found covered with an infect, of the genus *Aphis*, which, inferting its probofcis into the fine fap veffels, draws out the fap, and by a peculiarity of conftitution rejects, in the form of excrement, a product abundantly more rich and faccharine than the liquid it imbibes. See Aphis.

Dew, *Orange*. See Orange.

Dew, *Sun*. See Sun-*Dew*.

Dew, *Earth of*. See Earth.

Dew-*Born*, in the *Management of Cattle*, an exceffive fwelling of the body, proceeding from the greedinefs of a beaft to feed, when put into rank pafture.

This fwelling is often fo great, that the creature runs the utmoft hazard of burfting; in which cafe it fhould be made to ftir much, and purge well; but the proper cure is to bleed the creature in the tail, then putting a nutmeg into an egg, to thruft it down the creature's throat, fhell and all; after which, by walking him up and down, he will foon recover.

Dew-*Lap*, in *Rural Economy*, a name applied to the flefhy membranous fubftance, which hangs down from the throats of cattle of the neat kind.

DEWAERT, in *Geography*, an inconfiderable ifland, lying at fome diftance E. of Terra Magellanica, in South America; fo called from its firft difcoverer.

DEWAH, or Gogra, a river of Hindooftan, which traverfes the country of Oude, and joins the Ganges; fifteen miles W. of Patna.

DEWBERRY Bush, in *Botany*. See Rubus.

DEWEE, in *Geography*, an ifland in South Carolina, which forms one of the three harbours of the city of Charleftown.

D'EWES, *Sir* Symonds, in *Biography*, an induftrious antiquary, born at Coxden, in the county of Dorfet, in the year 1602. He finifhed his ftudies at St. John's College, Cambridge, and began at an early age to make collections of materials for the hiftory of his country. At the age of thirty he had completed his principal work, *viz.* the Journals of the Parliaments under Elizabeth, and had in his inquiries been enabled, according to his own account, to correct Camden's Britannia in almoft every page. He was appointed high-fheriff for the county of Suffolk in the year 1639, having been previoufly honoured with knighthood. In the following year he was elected reprefentative for the borough of Sudbury, in the long parliament. Sir Symonds was created a baronet in 1641; he, however, adhered to the parliament, and took the folemn league and covenant. In "the purge" of 1648, he was expelled the houfe, and from that period, to his death in 1650, he devoted himfelf to a retired and literary life, employing himfelf in copying records and other ancient documents, and in collecting coins and manufcripts. The only work by which this author is remembered, has already been noticed. This was revifed and publifhed by Paul Bowes, efq. in the year 1682. Several of his MS. collections, and a number of letters that paffed between him and his antiquarian friends, are preferved in the Britifh Mufæum. Biog. Brit.

DEWIT, or De Wit, Jaques, a painter of hiftory and portrait, was born at Amfterdam in 1695, and acquired the principles of his art from Albert Spiers, a portrait painter. He afterwards became a difciple of Jacques Van Halen, an hiftorical painter of confiderable reputation; under whofe inftructions he made great improvement, particularly by copying fome capital paintings of Rubens and Vandyck. In 1713, he obtained the firft prize in the Academy, for defigning after a living model, and the firft prize for painting hiftory; and he became more known by fketching feveral of the cielings in the Jefuits' church at Antwerp, originally painted by Rubens and Vandyck, which had been much injured by lightning. He declined the painting of portraits, though much folicited to engage in this branch of his art, and chiefly reftricted himfelf to the painting of cielings and grand apartments, in which he excelled by an elegance of tafte, and tolerable correctnefs of defign. His moft noted work was for the burgo-mafters of Amfterdam, in their great council-chamber; in which he chofe for his fubject Mofes appointing the 70 elders, and which he executed in a manner highly honourable to him as an artift. Without ever having feen Rome, he acquired the ftyle of the Italian mafters, by ftudying after the fineft defigns of the beft artifts of that country, which he collected with great judgment and expence. The colouring of Dewit is extremely good, and his compofitions are grand and pleafing; his pencil is free, and his touch abounds with fpirit and brilliancy; and a better tafte of defign would have rendered him truly eminent. But his fingular excellence confifted in his imitations of bas-relief in ftone, wood, or plafter, which he painted both in oil and in frefco, fo as to give them the appearance of real carvings. His fketches, though flight, are much admired for their freedom and fpirit, and are purchafed by perfons of the beft tafte. This artift, who died at Amfterdam, in 1754, etched, from his own defigns, a fet of fix fmall plates, reprefenting "groups of boys," which are executed in a very fpirited ftyle; and the "Virgin and Child." Pilkington. Strutt.

DE WITT, John, the celebrated Dutch penfionary, was born at Dort, where he was educated. He exhibited a ftrong tafte for mathematical ftudies, and publifhed, when he was only twenty-three years of age, a work of confiderable reputation, entitled "Elementa Curvarum Linearum." In the year 1650, he was chofen penfionary of Dort, and foon diftinguifhed himfelf as an able politician, and upright ftatefman. He was the advocate of peace, and oppofed very ftrenuoufly the war between the Englifh and Dutch. He was afterwards fuccefsful in effecting a peace with Cromwell. In this treaty was inferted a fecret article for excluding the houfe of Orange, which rendered De Witt very unpopular. He was, however, re-elected penfionary of Holland in 1663. In the war with England, which broke out foon after this, he was appointed one of the commiffioners to direct the navy, and afterwards appointed, with two others, to the command of the fleet; for his great fervices in this particular, and likewife as penfionary, he merited and received the thanks of the ftates-general. He afterwards fell into difgrace: by a courageous defence of his own fyftem of liberty, and by oppofing the repeal of the perpetual edict with refpect to the ftadtholderfhip, he became the object of horror to the Dutch populace, who conceived that their exiftence depended upon a ftadtholder. De Witt was attacked by four affaffins, who wounded him, and left him for dead in the ftreet. His brother Cornelius at this time was falfely accufed of an attempt on the life of the prince of Orange. The only witnefs was a barber of infamous character. The pufillanimous judges did not dare to oppofe the prevailing and popular cry: they condemned him to "fuffer the queftion." This man, who had bravely ferved his country in war, and who had been invefted with the higheft dignities, was delivered into the hands of the executioner, and almoft torn in pieces by the fevereft and moft favage tortures. In the midft of his agonies, he repeated, as applicable to himfelf, the ode of Horace.

"Juftum et tenacem propofiti virum," &c.

His life was fpared, and he was condemned by the judges, who have ever been held up to public infamy, to banifhment. The penfionary, who had not been prevented from performing the part of an affectionate brother and faithful friend, during this profecution, refolved not to defert him on account of the unmerited fufferings which he had endured. He followed him to prifon, and refolved to accompany him to the place of his exile. A fignal was given to the populace: they rofe in arms, broke open the prifon doors, dragged away the two brothers, and a thoufand favage hands vied with each other who fhould be the firft and deepeft ftained with the innocent blood of thefe uncorrupted, and incorruptible patriots. The brutal wretches were not fatisfied even with their lives: on their dead bodies they exercifed every indignity, which monfters in the fhape of men could invent and devife. Thus ended the De Witts, whofe actions will be more particularly noticed under the article United States. The penfionary, to whom this article is chiefly devoted, is defcribed by Mr. Hume as "a minifter equally eminent for greatnefs of mind, for capacity, and for integrity. Though moderate in his private deportment, he knew how to adopt in his public councils that magnanimity which fuits the minifter of a great ftate. It was ever his maxim, that no independent government fhould yield to another any evident point of reafon or equity; and that all fuch conceffions, fo far from preventing war, ferved no other purpofe than to provoke frefh claims and infults." Hume's Hift.

DE WITTSBURGH, in *Geography*, a town of America, in the ftate of New York, on the Sufquehana; 155 miles N.W. of New York.

DEX, a name ufed by many Greek writers for a worm or maggot, hatched of the egg of a beetle, and remarkable for its eroding wood. It is alfo called thrips and enxylon. The old Greeks ufed the pieces of wood eroded by it in various directions as feals. See Thrips.

DEXTANS, in *Antiquity*. See As.

DEXTER, in *Heraldry*, is applied to the right fide, as finifter is to the left.

The word is pure Latin, fignifying right-handed; whence the word dexterity for addrefs and ability in the performing of any thing.

Dexter-*bafe*, is the right fide of the bafe.

Dexter-*chief*, the angle on the right hand of the chief.

Dexter-*point*. See Point.

DEXTRARIUS, is underftood of one who takes the right hand of another; and the word dextrarii has been ufed for light horfes, or horfes for the great faddle; from the French deftrier, a horfe for fervice.

DEXTROCHERE, or Destrochere, in *Heraldry*, is applied to the right-arm painted on a fhield, fometimes naked, fometimes clothed, or adorned with a bracelet, and fometimes armed, or holding fome moveable, or member ufed in the arms.

The word is formed from the Latin dextrocherium, which fignifies a bracelet worn on the right wrift, mentioned in the Acts of the Martyrdom of St. Agnes, and the Life of the Emperor Maximus.

The dextrochere is fometimes placed at the creft.

DEY, the title of the fovereign of Algiers, under the protection of the grand feignior, called at Tunis the bey. A prince under this title was appointed by the fultan, at the requeft of the Turkifh foldiers, in the year 1710. The term dey, in the Turkifh language, fignifies an uncle by the mother's fide; and the reafon of the denomination is this; that the Turkifh military confider the grand feignior as their father, the republic as their mother, by which they are nourifhed and maintained, and the dey as the brother of the republic, and confequently the uncle of all who are under his dominion.

The dey is chofen out of the army; each order, even the moft inferior, having an equal right and title to that dignity with the higheft. Every bold and afpiring foldier, however obfcure his original and rank, may be confidered as the heir apparent to the throne; and with this farther advantage, that he lies under no neceffity to wait till ficknefs or old age has removed the prefent ruler; it is fufficient that he can protect himfelf with the fame fcymitar, which he has fheathed in the breaft of his predeceffor. As the chief command (fuch was the cafe at the time when Dr. Shaw vifited this country) lies open to every bold pretender, the deys rapidly fucceed one another; one in ten having rarely had the fortune to die in his bed; *i. e.* without a mufket-ball or fcymitar. Thofe few, who have thus peaceably departed, cannot attritbute it to any fuperior regard and efteem which the army had for them in particular, but rather to their own fuperior good fortune, in preventing an infurrection, by cutting off the confpirators before they could put their defigns in execution. Befides the age, experience, and valour, which are neceffary qualifications of a perfon to be elected to the office of dey, he muft alfo be a native Turk, and have made the voyage to Mecca. He has no guards, nor confiderable retinue; he prefides at the divan, and is moft diftinguifhed by the refpect and fubmiffion which are paid him.

DEYDESHEIM, or DIDINESHEIM, in *Geography*, a town of Germany, in the circle of the Upper Rhine, and bifhopric of Spire; 14 miles W. of Spire.

DEYNSE. See DEINSE.

DEYNUM, JOHN BAPTIST VAN, in *Biography*, was born at Antwerp in 1620, and devoted the early period of his life to the ftudy and practice of the art of painting; in which he arrived at diftinguifhed excellence. His fubjects were portraits in miniature, and alfo hiftory and landfcapes in water-colours, which he executed with furprifing neatnefs, judgment, and tafte. His works, moft of which were purchafed by the emperor and the king of Spain, were admired for the delicacy of his touch, for the fweetnefs of his colouring, for the exquifite manner in which they were finifhed, and alfo for elegance of compofition. Pilkington.

DEYSTER, LEWIS, an hiftorical painter, was born at Bruges in 1656, and became a difciple of John Maes, a painter of portrait and hiftory: but perfected himfelf in defign and colouring by the ftudy of the antiques, and of the beft modern productions at Rome for fix years, and by copying and examining the beautiful compofitions of the Venetian artifts for fix years more at Venice. His difpofition led him to feclude himfelf from public notice, after his return to his own country; but feveral performances for the public, in which he engaged, made him more known, and enriched him, while they raifed his reputation. At Bruges he painted two excellent pictures; *viz.* "Rebecca with Abraham's fervant at the well," and "Judith and Holophernes." But his moft capital performances are "The death of the Virgin," and the "Refurrection of Chrift, with the appearing of Chrift to Mary Magdalen, and the other Mary," in which the figure of our Saviour is accounted in no refpect inferior to Vandyck, either in colouring or defign.

He painted in the grand ftyle, and much in the tafte of the Italian fchool; he gave much elegance to the airs of his heads, and to the extremities of his figures; his draperies are loofe and light; his colouring is warm; and the fhadows were only glazed in the finifhing, with a compofition called "fphaltum." This artift died in 1711. His daughter, Anna, who died in 1746, aged 50, painted in the ftyle and manner of her father, and imitated his touch and colouring fo exactly in the copies after her father's works, that the ableft judges could not pofitively diftinguifh the copies from the originals. Pilkington.

DEZAIGNE, in *Geography*, a fmall town of France, in the department of the Ardêche; 12 miles W. of Annonay.

DEZALLIER, D'ARGENVILLE, ANTONY-JOSEPH, in *Biography*, was born at Paris in the beginning of the laft century. He was educated in his native city, but a confiderable time after this he fpent in foreign countries, particularly in Italy, where he formed a tafte for the fine arts. He became acquainted with men of fcience in various parts of Europe, and was elected member of the Royal Society in London, and of the Academy of Sciences at Montpelier. He wrote fome confiderable articles in the French Encyclopedia; and in 1747 he publifhed, in quarto, a treatife on the theory and practice of gardening, and in 1757 a larger treatife on Conchology, in two volumes quarto. This is faid to be his moft valuable work. His arrangement is made from the external form of fhells, according to which he claffes them as univalve, bivalve, and multivalve: he then divides them again into fhells of the fea; of frefh water; and of the lands. He alfo gave an account of the feveral genera of animals that inhabit fhells. He publifhed a work on oryctholugy, or a treatife on foffils. Perhaps his moft confiderable literary production was a biography of celebrated painters, which was publifhed in three volumes quarto, and likewife in four volumes octavo. He died at Paris in 1766; and his fon has continued the biography began by the father by the addition of two volumes, containing the lives of architects and fculptors. Gen. Dict.

DEZIZE, in *Geography*, a town of Egypt, on the Nile, fuppofed to be the place where the prophet Jeremiah was buried, near Cairo.

DEZKAK, a town of Perfia, in the province of Segeftan, 110 miles E. N. E. of Zareng.

DEZNY, or DESNY, a fmall town of Bohemia, in the circle of Bechin, or Bechynoko, remarkable for its excellent mineral waters.

DFJEFAN, a town of Arabia, in the country of Yemen, fituated on the coaft of the Red fea; 22 miles W. of Abu-Arifch.

DGIARON, a town of Perfia, in the province of Farfiftan; 84 miles S. of Schiras.

DHAR, a town of Hindooftan, in the country of Malwa; 42 miles W. of Indore, and 36 S. S. W. of Oudein.

DHARAMSALEH, a town of the country of Thibet, 60 miles from Serangpour.

DHAUN. See DAUHN, or DAUN.

DHOOLPOUR, a town of Hindooftan, in the country of Agra; 32 miles S. of Agra.

DHUL, or DUL, a lake of Afia, in the country of Cafhmere; five miles N. E. of Cafhmere. One branch of the Baghyretty river is faid to proceed from this lake above Cafhmere; but Mr. Rennell obferves, that as this lake has no outlet on the eaft, from the valley of Cafhmere, every branch of the Ganges that comes from the north-weft

north-weſt muſt, of courſe, ſpring from the mountains that lie on the eaſt of Caſhmere.

DHUY, a ſmall town of France, in the department of Sambre and Meuſe, diſtrict of Namur, with a population of 520 individuals. It is the chief place of a canton which upon a territorial extent of 152½ kiliometres, comprizes 31 communes and 10,258 inhabitants.

DIA, Δια, the beginning of divers terms in medicine, chirurgery, pharmacy, &c. Where theſe three letters commence the name of a remedy, unguent, plaſter, cataplaſm &c. they ſignify compoſition and mixture; as in diapaſma, diachylon, &c.

Dia is likewiſe the beginning of many terms in the other arts: as diameter, dialogue, &c. on all which occaſions, dia, which is an inſeparable particle, or prepoſition, is borrowed from the Greek δια, *ex*, or *cum*; which begins the ſame words in the Greek.

Indeed we have words wherein dia is no prepoſition borrowed from a foreign language; though it is poſſible, the words themſelves may; as in diamond, dial, &c.

Dia, in *Mythology*, a goddeſs among the Romans, probably the ſame with Cybele.

Dia, in *Ancient Geography*, a town of Scythia, before Phaſis, near the Cimmerian Boſphorus.—Alſo, an iſland of the Mediterranean ſea, about three leagues from that of Crete, and rather a rock than an iſland; now called Standia. —Alſo, a town of Theſſaly, founded by Eacus, according to Steph. Byz.—Alſo, a town of Thrace, near mount Athos. —Alſo, a town of Eubœa, on the north ſide of the iſland, oppoſite to Theſſaly: it was alſo called Athenæ Diades, and is ſaid to have been founded by Dias, an Athenian, who called it after his own name, and that of his native city, Athens, Diades. The inhabitants of Dia peopled the city of Canæ, in Æolis.—Alſo, a town of the Peloponneſus, near the promontory *Scylleon*.—Alſo, a town of Luſitania, near the ocean.—Alſo, a town of Italy, near the Alps. Steph. Byz. ſays that ſeveral iſlands bore this name.

DIABATA, Diabeta, or Diabete, an iſland of the Mediterranean ſea, near that of Sardinia.

DIABATHRA, in *Antiquity*, a kind of ſhoe worn by the Grecian women. Pitiſc. Lex. Ant. in voc.

DIABE, in *Ichthyology*, the name of a prickly ſea-fiſh of the orbis, or globe-fiſh kind, and in all things reſembling the hiſtrix, or porcupine-fiſh, except that its ſpines or prickles are all fixed into its ſkin by three inſertions. See Diodon.

DIABETÆ, in *Ancient Geography*, iſlands of the Mediterranean ſea, in the vicinity of that of Rhodes. Pliny ſays that there were four iſlands of this name.

DIABETES, in *Medicine*, a diſeaſe characteriſed principally by a profuſe excretion of urine.

The term diabetes is derived from διαβαινω, *tranſeo, I paſs through*, becauſe not only the fluid ingeſta, but ſome of the ſolid, paſs off by the urine.

Various other names have been given to this diſeaſe by the old writers. Thus, it has been called *dipſacus*, and *morbus ſitibundus*, from the great thirſt which accompanies it; *cachexia urinaria*, from the conſtitutional failure which enſues; alſo *fluxus urinæ, diarrhœa ad urinas, diarrhœa ad matulam*, &c.

The etymology of the word may admit of every immoderate diſcharge of urine being called diabetes; but its application is confined by phyſicians to an aſſemblage of ſymptoms, of which the increaſed flow of urine is the moſt obvious, at leaſt, in the commencement. The other diagnoſtic ſymptoms are, a great thirſt; and an unuſual craving for food; a dry, ſhrinking, and parched ſkin; a waſting of the fleſh and ſtrength; and particularly a ſweetneſs, or ſaccharine quality of the urine. In ſome caſes, indeed, this quality, without any increaſe of quantity, is the principal characteriſtic of the diſeaſe.

This diſeaſe commonly comes on ſlowly, and almoſt imperceptibly, without any previous diſorder. It often ariſes to a conſiderable degree, and ſubſiſts long, without being accompanied with evident diſorder in any particular part of the ſyſtem. There is, indeed, ſome difficulty in aſcertaining the firſt and earlieſt ſymptoms of the diſeaſe, or that ſtate of it in which the ſweetneſs and increaſe of the urine take place; as the diſcharge of the urine is generally conſidered by the patients as the neceſſary effect of the thirſt, and quantity of drink; it is thus for a long time often overlooked. But when the hectic fever, and waſting appear, the diſeaſe is then generally detected, and the hiſtory of it from that period has been accurately detailed.

Dr. Rollo affirms, that it can ſcarcely be doubted, that a previous affection of the ſtomach takes place before the period, or at the time when the peculiar character of the diſeaſe, by the production of ſaccharine matter, is formed, and ſenſibly ſhewn in the urine. In his firſt caſe, the bulimia canina exiſted, at leaſt, ſix months before the hectical ſtate of diabetes appeared, and ſome time before the increaſe in the diſcharge of urine; and morbid affections of the ſtomach are ſaid to have preceded the detection of the diabetic diſeaſe, in the caſes communicated. But this does not appear to have been always obſerved; and ſuch ſtatements of facts muſt be received with caution, where a particular hypotheſis is to be aided by their eſtabliſhment.

The moſt remarkable ſymptoms of diabetes, when completely formed, are voraciouſneſs of appetite, or a frequent craving for food, which is not followed by the feel of entire ſatiation; a parched mouth, with conſtant ſpitting of a thick viſcid phlegm, of a mawkiſh, ſweetiſh, or bitteriſh taſte; intenſe thirſt; a whitiſh tongue, with red bright ſides; red and ſwelled gums, with the teeth feeling as on edge from acids, and looſe in their ſockets; head-ach; a dry hot ſkin, with fluſhing of the face; a pulſe ranging from 80 to 90, but moſt generally about 84 or 86; an increaſe of clear urine, of a light ſtraw colour, having a ſweetiſh taſte reſembling ſugar, or rather honey and water; an uneaſineſs of the ſtomach and kidneys; a waſting of fleſh; a wearineſs and diſinclination to motion or exertion, with the feeling of weakneſs; an excoriation, with ſoreneſs of the glans, penis, and prepuce, which is ſometimes ſwelled, and often in the contracted ſtate of phymoſis; and the venereal appetite is altogether loſt. In females there is a peculiar uneaſineſs about the meatus urinarius. Theſe ſymptoms continuing, the patient becomes ſo enfeebled as to be confined to bed; an unremitting febrile ſtate and ſlight delirium take place, ſometimes with a removal of the peculiar character of diabetes.

In ſome inſtances the progreſs is ſlow, the ſymptoms remaining ſtationary, and even ſometimes becoming ſo ſlight as to induce the patient to ſuppoſe himſelf nearly in health. This ſtate, however, ſeems to have depended upon the accidental forbearance of thoſe things which aggravate the complaint. Deviations in diet and regimen; and mental emotions, eſpecially grief, anxiety, and vexation, generally increaſe the ſymptoms.

The appearance of the urine in different inſtances, and even at different periods of the ſame caſe, varies conſiderably; nay, it varies at different parts of the ſame day, according to the quantity and quality of the food, the length of time after eating, and the ſtate of the ſtomach at the time with regard to activity, which in the more chronic degrees

degrees of the difeafe is variable, as to voracioufnefs and craving, while in the acute it is more fteady. In general the urine is not only copious, but of an odorous fmell, tranfparent, of a light ftraw colour, of a fweetifh tafte, and yielding, by evaporation, a faccharine matter, refembling treacle or molaffes. Sometimes, however, it fcarcely exceeds in quantity the ordinary difcharge of health; but in quality, has the diabetic character, of yielding the faccharine extract on evaporation; which, like all fweet and faccharine fubftances, is capable of undergoing the vinous and acetous fermentations, and has every other quality of vegetable fugars. The quantity of urine difcharged is generally, however, greater than the quantity of liquid taken. Dr. Home, fpeaking of one of his patients, fays, "Arthur paffed from 12 to 15 pints of urine during 24 hours. When he drank 10 pints, he paffed 12; when he drank 12 pints, he paffed 14 or 15; fo that his urine exceeded his drink generally by two pints." His other patient, Murray, paffed an excefs of urine over his drink of 7 or 8 pints in the 24 hours: "when he drank 4, he paffed 12 pints a day; when he drank 3, he paffed 10 pints." The urine itfelf, in feveral cafes, has exceeded the whole ingefta, folid and liquid; and in general there is a daily diminution of weight, fo that the urine, together with the other difcharges, generally exceeds the quantity of ingefta. This lofs of weight was afcertained in one or two cafes, publifhed by Dr. Rollo, by weighing the patient daily. And Dr. Home obferves, with refpect to his patient, Murray, that his folid food amounted nearly to the excefs of his urine above his drink. But immenfe difcharges of urine are mentioned by fome authors; as in the cafe of the girl defcribed by Cardanus, where 36 pints were paffed each day, when her body weighed only 250 pounds, and her meat and drink only 7 pounds; and as in that of a woman mentioned by Shenckius, where the urine paffed in a few days was more than the weight of her own body. But there is fo much room for deception in fuch inquiries, that thefe ftatements muft be received with caution.

The urine varies in other refpects occafionally. In fome inftances a whitifh fluid, refembling the chyle itfelf, is faid to have paffed off from the kidnies. In other inftances, the urine is faid to be inodorous and deftitute of the faccharine quality; hence, writers have thought it neceffary to mark this diftinction by peculiar terms; this form of the difeafe being denominated diabetes *infipidus;* the former D. *mellitus,* from the honey-like flavour of the urine. A refpectable teacher in London, confidering thefe two forms of the difeafe as altogether different in their nature, has propofed to defignate them by different generic titles, and to call the former *polyuria debilitans,* and the latter *melituria tabifica,* which fufficiently exprefs the nature and tendency of the two diforders. The diabetes, with clear infipid urine, is a more rare occurrence. Dr. Cullen, who had feen twenty cafes of diabetes, had met with only one, in which the urine was not fweet. He doubts, indeed, whether a cafe of idiopathic diabetes ever occurs, in which the urine is perfectly free from the faccharine matter.

While under the diabetes mellitus, the conftitution may be attacked with other difeafes, which feem to be commonly of an inflammatory nature, and may prove fatal; indeed, the diabetic diathefis appears to render the body very fufceptible of inflammation. It is curious, however, that the diabetes is fometimes fufpended by the attack of another difeafe. We recollect to have heard Dr. Gregory, profeffor of medicine at Edinburgh, mention two inftances of this fort which occurred in his practice; in one all the diabetic fymptoms were fufpended during an attack of pneumonia, which fupervened; and in the other during that of an inflammatory fore throat.

The diabetes is mentioned in the writings of phyficians of almoft all ages. For if it has not been noted by Hippocrates or Profper Alpinus, it has occupied the attention of Theophilus, Actuarius, Aretæus, Aetius, Paulus Æginеta, Avicenna, Galen, &c. Aretæus has given a long and clear hiftory of the difeafe, and pointed out the profufe difcharge of urine, the emaciation and debility, the inextinguifhable thirft, yet the drink not equalling the urine in quantity, the parched fkin, &c. all belonging to true diabetes. Galen fays that he had feen but two cafes of diabetes, in which there was a conftant thirft, and difcharge of liquids, unchanged in their quality; and he compares this difeafe of the kidnies to a lientery. But as he defcribes many cafes of bulimous appetite, and great thirft, it is probable that he had feen a greater number, in which the urinous affection had been overlooked.

It is fingular, however, that the peculiar condition of the urine was unnoticed, as characteriftic of the difeafe, till our countryman, Dr. Willis, pointed out its faccharine tafte; neither the ancients nor the moderns, in the other countries of Europe, had obferved it, till they were directed to it by the Englifh; hence the diabetes mellitus is called by Sauvages D. *anglicus.* The urine had been tafted, however, long before the time of Willis. For Trincavella defcribes a cafe in which a julepum rofaceum was adminiftered; and he affirms that the urine had the fame colour and fmell as the julep; and that fome of the attendants who chofe to tafte it, faid that there was no change in the flavour. (De Rat. Curand. Partic. &c. lib. x. cap. 11.) And Hercules Saxonia mentions one fpecies of diabetes, which he defines, "Legitima diabetes, eft excretio rei potulentæ prorfus non mutatæ in odore; colore, et *fapore,* per vias lotii." But like his friend Trincavella, he attributed the fweet fmell, colour, and tafte of the urine, to the fweetened ptifan which the patient had drunk. The faccharine beverage and diet of the eaftern countries, Dr. Girdleftone obferves, will perhaps account for the ancient writers omitting to notice the honey-like tafte of the urine of diabetic patients. And as it was generally the practice of the French and Italian phyficians to prefcribe, in moft difeafes, ptifans fweetened with honies or fyrups, it is not to be wondered at, that Willis was the firft phyfician who pofitively noticed the honey-like tafte of the urine in true diabetes, as arifing from a change which the drink had undergone. It may be remarked that that accurate obferver of difeafes, Sydenham, has taken no notice whatever of the fweetnefs of the urine in diabetes, notwithftanding it had previoufly been pointed out by Willis.

The quantity of faccharine matter in the urine is, in fome cafes, very confiderable, and it is combined with a quantity of animal extractive matter. In the inftances related by Dr. Home, the urine was evaporated by Dr. Black; Arthur's urine afforded an ounce and a half of a brown faccharine matter from each pound; Murray's, treated in the fame way, gave but one ounce for each pound of a fubftance refembling coarfe brown fugar. So that Arthur paffed twenty ounces and a half of this matter in twenty-four hours, when he made fifteen pints of urine. Dr. Home obferves that this is a wonderful proportion of fugar to the fluid; fince a pound of afs's milk affords only half an ounce of fugar; and a pound of cow's milk, only half that quantity. The quantity of fugar detected in the urine of captain Meredith, whofe cafe is related by Dr. Rollo, was calculated at twenty-nine ounces in the twenty-four hours.

This fugar-making procefs, then, conftitutes the effential part of the difeafe; it has been the fubject of much enquiry;

quiry; and many hypothefes have been reforted to, to explain the nature of the procefs, and to determine in what part of the fyftem, or by what organs, it is carried on. Dr. Mead confidered diabetes as "akin to jaundice," and affirms that fteatomatous tumors were always found in the liver; and "as to the fweetnefs of the urine, this is all bilious, for the water of the bile feparated from its falt is fweet." (Treatife on Poifons, Effay 1ft.) But in Dr. Home's patients, and others, no difeafe of the liver has been difcovered on diffection; and a better chemiftry has refuted the notion that there is fugar in the bile. Some authors confider diabetes as a local difeafe of the kidneys, which not only pour out the increafed quantity of urine, but by a morbid change in the action of the fecretory veffels, elaborate the faccharine matter too. Since the glands of the mammæ, they fay, can fecrete fugar, why may not the kidneys? The analogy, however, is not correct. For the mammæ are formed by nature for the fecretion of a faccharine fluid, the kidneys are not; we might therefore as well expect the kidneys to fecrete bile, as to produce fugar. Dr. Home has the merit of firft fuggefting a theory, which, although exceedingly imperfect, approximates, perhaps, nearer to a rational and probable view of the fubject than any other that has been conceived. Some had attributed it to fpafms of the fecreting veffels, in the kidneys, but he objects to this notion, becaufe antifpafmodics do not alleviate the fymptoms, and becaufe fpafm will not account for the faccharine, acefcent, and fermentable urine. In hyfteria the urine has none of the diabetic qualities. Others had attributed the difeafe to the perfpiration being diminifhed, or the inhalation increafed, as they can account for the quantity of urine fo much furpaffing the drink in no other way. But he juftly objects, that this will not account for the particular qualities of the urine; that diaphoretics are not attended with any good effects in diabetes; and that in his two patients perfpiration and urine were increafed at the fame time.

"Were I to give a theory," fays Dr. Home, "to explain the nature and fymptoms of this wonderful difeafe, I would fay, that it arifes from a defect of the animal or affimilatory procefs, by which the aliment is converted into the nature of our body. I have long looked on the excefs or defect of this procefs as the fource of many diforders. All putrid difeafes, the fcurvy, &c. feem to be owing to its excefs; acidity of the ftomach, &c. to its defect. Among the latter difeafes diabetes may be arranged. For, 1. The remote caufes fhew it. It arifes from what debilitates the body, as moifture, preceding difeafes, great evacuations, &c. by which it becomes incapable to affimilate the food. So Sydenham thought, "Affimulandis fuccis protinus impar eft." 2. The white chylous matter, which is often fecreted with the urine, fhews, that the vegetable part of the chyle is not affimilated. The dilatation of the urinary excretories cannot, alone, account for this, as the ferous part of the fluids would then efcape too, which does not happen. 3. Sugar is found in diabetic urine. Sweet chyle is the firft product of the ftomachic and inteftinal digeftion; as chyle, in the thoracic duct, and milk, which is a fpeedy fecretion of it, contain much faccharine matter. This is changed, in fome hours, by the animal procefs, into an ammoniacal falt, which is that found in all the excretions. But the faccharine falt, ftill remaining in the urine, which is the moft perfectly animalized fluid, fhews that there is great defect in the animal procefs. 4. Urine being of a feptic nature, runs faft into putrefcency. But the diabetic urine turns acidulous, and with, and often without yeaft, undergoes the vinous fermentation. Thefe peculiarities fhew its vegetable nature; as vegetable juices alone are capable of the vinous and acetous fermentations. Thefe arguments appear more convincing than any of the former. But it may be objected to them, 1. That animal food fhould cure it, which it did not; 2. That feptics, which brought on putrid eructations, made no change; 3. That the proportion of faccharine matter is much greater in their urine, than in milk. But milk has not, perhaps, the whole faccharine falts of the chyle." (Clinical Experiments, p. 318, *et feq.*)

Dr. Cullen adopted a fimilar opinion refpecting the nature of diabetes, and believed that the proximate caufe of the difeafe "is fome fault in the affimilatory powers, or in thofe employed in converting alimentary matter into the proper animal fluids" § 1512 Firft Lines. But he candidly acknowledged, that it was a theory embarraffed with fome difficulties which he could not very well remove.

Dr. Rollo has more recently taken up this theory, and attempted to reduce it to a more definite form. "The immediate caufe of the diabetes mellitus," he fays, "is a morbid condition of the ftomach, forming or evolving from vegetable fubftances faccharine matter, which is quickly feparated, as a foreign body, by the kidneys. But to be more particular; we allege that this difeafe confifts in an increafed morbid action of the ftomach, with too great a fecretion and an alteration in the quality of the gaftric fluid, producing faccharine matter, by a decompofition of the vegetable fubftances, taken in with the food, which remains unchanged." This hypothefis is fupported by the following arguments. 1ft. That a ftomach-affection generally precedes the urinary characteriftic fymptoms of the difeafe. 2dly. That a ftomach-affection always accompanies the difeafe, and is materially different from that which is fympathetic of primary affection in the kidneys. 3dly. That a diet of animal food, with an entire abftinence from vegetable or other matters, capable of forming fugar in the ftomach, removes fpeedily the general fymptoms, the faccharine matter, the increafe of urine, and its unnatural qualities: and, 4thly. That diffection has fhewn no morbid condition of the kidneys, but what may be referred to a continuance of increafed action, from the application of a fimple ftimulus, augmenting merely the capacity of the veffels. (Rollo on Diabetes, 2d edit. p. 436.)

It has been objected to this theory, that if the faccharine matter is formed by the ftomach, it fhould be detected in the blood, in its way to the kidneys; but that this has not been done. But to this it is replied, that the tafte is a very inaccurate teft of the exiftence of any matter in fuch combination; that Dr. Dobfon affirmed that faccharine matter did exift in the ferum of the blood, in a cafe treated by him, (Med. Obf. and Inquir. vol. v.) that the ferum in one or two cafes has been obferved to be of a whey-like colour; and that certain matters, as nitre, turpentine, &c. may pafs by the kidneys, without being detected in the blood. Thefe ftatements, however, can hardly be confidered as fatisfactory refutations of the objection, or as removing the doubt which hangs over the fubject.

No light is thrown upon the nature of diabetes by a confideration of its exciting caufes; for the moft various and even oppofite caufes have been affigned for it, in the various inftances that are on record. The difeafe has been obferved to follow acute difeafes, efpecially fevers; Sydenham remarked that it followed intermittents, efpecially if much venæfection had been ufed. Acrid purgatives are alfo faid to have given rife to it by Sydenham; and Dr. Home affirms that he knew the chylous fpecies brought on by too frequent dofes of jalap and calomel. The exceffive ufe of cold watery liquors appears to have occafioned diabetes in fome cafes; as drinking largely of particular mineral waters; of weak acid Rhenifh

Rhenifh wines; and more efpecially of liquors impregnated with a diuretic quality. Cold-bathing, and expofure to cold and moifture, under various circumftances, have likewife been faid to excite the difeafe. In feveral cafes, collected by Dr. Rollo, there was an obvious hereditary difpofition to the difeafe, which attacked individuals of the fame, as well as of different generations, in the fame family.

Diffection has not contributed in any degree to elucidate the nature of diabetes. The liver has been frequently found in a perfectly found ftate, contrary to the obfervation of Dr. Mead; and often no morbid change could be detected in any organ of the body. The kidneys have generally been found enlarged, efpecially the tubular uriniferous portion, and fofter than natural; but this is as probably the effect of the quantity of liquid conftantly ftraining through it, as the caufe of the increafed fecretion. In fome cafes even the kidneys have been found in a perfectly natural condition. (See the diffections in Dr. Rollo's book, and in Dr. Home's; and two others related by profeffor Rutherford, in the third number of the Edinburgh Medical and Surgical Journal, 1805. Another by Dr. Baillie, Tranflations of a Society for the Improvement of Medical and Chirurgical Knowledge, vol. ii.)

In this ftate of uncertainty in regard to the feat and nature of the *difeafe*, the *cure* of diabetes cannot be directed with any certainty of fuccefs, or upon the rational principle of removing the proximate caufe. All thofe who have feen the difeafe, agree in pronouncing it difficult of cure, efpecially if the patient is old, if it arofe from habitual drinking, or if it has been of long ftanding; and various medicines have been reforted to, according to the various opinions of the practitioners, or as the failure of preceding remedies fuggefted a change. Many of thefe have been faid to effect a cure in individual inftances; but in the hands of different practitioners, they have fo often failed refpectively, that their efficacy muft be doubted.

Some have fuggefted, that, by reftoring the function of perfpiration, the unufual determination to the kidneys would be diminifhed; and have hence recommended fudorific medicines, as the warm bath, warm clothing, friction with oil, &c. In one inftance, the warm bath was faid to have cured the difeafe, under the direction of a Mr. Werner. (See London Medical Journal for 1790.) And Dr. Mac Cormick, of Antrim, mentions two cafes of diabetes, which were cured by the continued ufe of large dofes of Dover's powder at bed-time. (See Duncan's Medical Commentaries for 1783.) But in many other cafes, fuch medicines have failed altogether to give relief. In thofe treated by Dr. Home, although fweating was produced, the excretion by the kidneys was not diminifhed. Antifpafmodics have had no effect on the difeafe, nor have ftimulants, fuppofed to act upon the lax kidneys, as fuggefted by Dr. Brifbane, been of any ufe. He recommended, upon this principle, the tincture of cantharides, a medicine which has not been obferved to have any efficacy in this complaint. Aftringents have been tried, as in other increafed evacuations; fuch as alum, and alum-whey, fo ftrongly recommended by Dr. Mead, upon theoretical principles; alfo gum kino, and catechu, in confiderable dofes, but generally without fuccefs. Dr. Fothergill's patient is faid to have recovered, after taking alum-whey, lime-water, and fudorifics, calomel and rhubarb, and having a blifter applied over the facrum. (Med. Obfervat. and Inquiries vol. iii.) And Morton cured a patient by a milk diet, an aftringent julep, and electuaries of bole, and gum tragacanth. Tonic and corroborant medicines have alfo been employed, to reftore the ftrength and health of the conftitution at large, and of the digeftive organs in particular. Peruvian bark, bitters, chalybeates, the cold bath, &c., have been among the remedies of this clafs, that have been ufed; and thefe, like the others, in a few individual inftances, have been faid to remove the fymptoms; but more frequently, as in Dr. Home's cafes, and others, they have failed. In one of Dr. Ferriar's patients, cinchona and fulphuric acid contributed to reduce the urine from 10*lb* daily, to its natural ftate. And the fame author affirms, that he had lately cured three cafes of confirmed diabetes, by a combination of cinchona with uva urfi and opium; the fuccefs of which had been fo great as to prevent him from trying Dr. Rollo's plan. (Ferriar's Effay on Digitalis. See alfo his Medical Hiftories and Reflections, vol. i.)

It is obvious, that all the medicines which have been employed for the cure of diabetes have been, in a great majority of cafes, altogether unfuccefsful; nor can all the cafes be confidered as abfolutely cured, which have been recorded as fuch. For it is certain that in many inftances, where the fymptoms of diabetes, efpecially the morbid quantity of urine have been fufpended, they have neverthelefs fpeedily returned, where the remedies were omitted, and ultimately proved fatal. The moft fuccefsful plan of treatment that has yet been devifed, we have now to mention.

Upon the fuppofition that the difeafe confifts effentially in a defect of the power of affimilation, whence the unanimalized, chylous juices, were fuffered to pafs off in their crude ftate; it was long ago fuggefted by the fagacity of Sydenham, that the diabetic patient ought to eat meats of eafy digeftion, fuch as veal, mutton, and the like, and to abftain from all vegetables and fruit whatever. (See his Epiftle to Dr. Brady.) Dr. Home again fuggefted the fame expedient, and mentions its failure as a reafon for doubting the correctnefs of the theory. But the fuggeftion had never been put to the teft of fevere experiment, and was therefore almoft forgotten, till Dr. Rollo had the merit of calling the attention of the profeffion to the fubject.

As we are ignorant of the nature of the action of the chylopoetic or affimilatory organs, in producing the faccharine matter, the only practicable mode of preventing its formation, is the abftraction of the pabulum of this matter, *i. e.* of all vegetable fubftances from the diet. And while we thus remove the means of forming faccharine matter, it is not unlikely that we may remove the morbid action, in the courfe of time, upon which its formation depends. This was the mode in which Dr. Rollo reafoned. Animal food, confinement, with an entire abftinence from every kind of vegetable fubftance, afforded the general means, which might perhaps be aided by the ufe of fuch medicines as feem to be moft remote from any thing like a vegetable, acefcent, or faccharine quality; as fulphur, fulphurated potafs, or ammonia, alkalies alone, and calcareous and teftaceous fubftances. The fuccefs of the exclufively animal diet was fpeedy and great in the cafe of captain Meredith, related by Dr. Rollo; and in his fecond cafe decided benefit accrued from its ufe, while it was perfevered in. The plan with which captain M. commenced was the following:

Breakfaft.—One and a half pint of milk, and half a pint of lime water, mixed together, and bread and butter.

Noon.—Plain black puddings, made of blood and fuet only.

Dinner.—Game or old meats, which have been long kept, and as far as the ftomach may bear, fat and rancid old meats, as pork. To eat in moderation.

Supper.—The fame as breakfaft.

Secondly. A drachm of kali fulphuratum, to be diffolved in four quarts of water, which has been boiled, and to be ufed for daily drink. No other article, either eatable or drinkable, to be ufed than what has been ftated.

In three days the diabetic ſymptoms were obviouſly diminiſhed. Every portion of vegetable matter was then omitted, even the bread. By perſevering in this regimen the ſymptoms were entirely removed. The urine returned to its natural quantity and quality; the patient regained his ſtrength, and recovered much of his fleſh, and went on actual ſervice. In the courſe of his cure, he one day ate an apple, which increaſed the urine by nearly a quart, and brought back its ſaccharine quality. The diſeaſe, in this caſe, had been but of ſeven months' duration, when the plan of cure was begun.

In Dr. Rollo's ſecond caſe, the diſeaſe was of at leaſt three years ſtanding; the animal diet produced a conſiderable alleviation of the ſymptoms, during the ſhort time that it was perſevered in; but, having relinquiſhed it, the patient ſuffered a return of all the ſymptoms, and died.

From the facts, which Dr. Rollo has ſtated from his own obſervation, and the caſes communicated to him by other practitioners, it cannot be doubted that the animal diet has a great influence on the ſymptoms of diabetes, and has contributed more directly and effectually to its alleviation, than any meaſure hitherto adopted; and that where the plan is proſecuted with great ſteadineſs and perſeverance in recent caſes, a cure may probably be effected. It is to be lamented, however, that this mode of cure is ſo contrary to the inclinations of the ſick, that it is almoſt impoſſible to prevail upon them to perſevere in its uſe. The deſire for vegetable matters in ſome ſhape or other ſeems to be almoſt irreſiſtible. Though perfectly aware of the efficacy of the regimen, ſays Dr. Rollo, yet they commonly treſpaſs, concealing what they feel as a tranſgreſſion againſt themſelves. They expreſs a regret, that a medicine could not be diſcovered, however nauſeous, which would ſuperſede the neceſſity of any reſtriction in diet.

When, during the uſe of the animal diet, the urine has loſt its ſaccharine quality, and at the ſame time its quantity continues greater than natural, and it contains more of the animal extractive matter in a viſcid and tenacious form, the appetite remaining keen, it may be preſumed that the morbid condition (the increaſed action according to Dr. Rollo) of the digeſtive organs is not removed. The hepatized ammonia, opium, and antimony, may then be reſorted to, until the urine ſhews a more natural condition; namely, becomes moderate in quantity, and high-coloured, with ſome turbidneſs, and furniſhing on evaporation an offenſively ſmelling and ſaltiſh-taſted reſiduum, without tenacity; and the ſtomach at the ſame time loathes food, and the appetite is loſt. At this time the tongue and gums will be found to have loſt their florid colour, and to have become pallid.

When ſuch a ſtate occurs, exerciſe is to be enjoined, and a gradual return to the uſe of bread, and of thoſe vegetables and drinks which are the leaſt likely to furniſh ſaccharine matter, or to become acid in the ſtomach, with the occaſional uſe of bitters, &c. Should this period of the diſeaſe be overlooked, and the confinement and animal food rigidly perſevered in, ſcurvy, or ſomething akin to it, might be produced. The vegetable ſubſtances, which have appeared to be the ſafeſt, in the change from the animal diet, are broccoli, ſpinage, cauliflower, cabbage, and lettuce. Theſe do not ſeem to furniſh ſugar, when prudently uſed, in the diabetic ſtomach, after a proper adoption of the animal diet. But when theſe vegetables have been ſafely taken, a return to a very ſmall quantity of bread has reproduced the ſaccharine matter in the urine, and the general ſymptoms of diſtreſs, as thirſt, &c. The urine ſhould, at this period, be very frequently examined, and on any appearance of a return of the diabetic ſtate of it, the animal diet muſt be again ſtrictly renewed. A frequent examination of the urine at all times will afford the beſt teſt of the ſtate of the diſorder, and of the nature of the treatment which may be required. Rollo.

It is to be remarked, however, that in ſome caſes, the animal diet has ſucceeded in changing the condition of the urine, whilſt the emaciation, and the eſſential conſtitutional condition have remained. And it is the obſervation of a very intelligent phyſician, that he never ſaw a confirmed caſe of diabetes, "wherein there was not ſome conſiderable diſorder of the conſtitution, or a defect of ſome organ eſſential to life." (Willan on Diſeaſes in London, p. 186.)

The preceding obſervations apply to the common form of the diſeaſe, the diabetes *mellitus*. In the D. *inſipidus*, where the diſeaſe conſiſts merely in a profuſe ſecretion of the natural urine, from a morbidly increaſed action of the ſecreting veſſels of the kidneys, the prognoſis is more favourable. The latter form of the diſorder appears to have been occaſionally produced by the ſtimulus of a calculus in the kidney; at other times without any obvious cauſe of ſtimulation in that organ. The indications in the D. *inſipidus*, will be, to leſſen the determination of blood to the kidneys, by increaſing the perſpiration by diaphoretic medicine, warm-bath, &c.; to avoid thoſe articles of diet and drink, which have a particular diſpoſition to excite the action of the kidneys, as much warm liquor, ſuch as tea, punch, &c.; and to ſtrengthen the ſyſtem at large by the various tonic medicines, bark, ſteel, bitters, &c. The aſtringent medicines are particularly indicated in this form of the diſeaſe, where the diminution of a natural excretion is alone to be attempted. Hence the alum or alum-whey, gum kino, bark, and ſulphuric acid, uva urſi, &c., may be adminiſtered with more rational hopes of ſucceſs, than in the D. *mellitus*. Drains from the vicinity of the region of the kidneys, as bliſters, or iſſues in the loins, may be alſo tried, as means of diverting the courſe of the fluids from the kidneys.

Diabetes, or *Exceſſive Staling*, in *Farriery*, a diſeaſe of horſes which, at its commencement, admits of an eaſy cure; but which often proves very obſtinate, and even incurable. At firſt the complaint conſiſts merely in an increaſed ſecretion of urine, which is generally tranſparent and colourleſs, like water; but at length the horſe becomes feveriſh, and ſuffers much from thirſt; his appetite is diminiſhed, and his pulſe is quickened; he is generally hide-bound, and gradually loſes fleſh and ſtrength. Some have recommended lime-water in this diſeaſe; others have had recourſe to diaphoretic medicines, in order to promote perſpiration. Bark and other tonics have been alſo preſcribed as uſeful remedies. Mr. White, in his "Compendium of the Veterinary Art," informs us, that, in recent caſes, he adminiſtered with ſucceſs the following ball; *viz.* opium, 1 dram, powdered ginger, 2 dr., and yellow Peruvian bark, ½ oz., formed into a ball with ſyrup, for one doſe. If this remedy ſhould fail, he recommends one of the following formulæ: 1. Emetic tartar, 2 dr., opium, 1 dr. made into a ball for one doſe: 2. Salt of hartſhorn, 2 dr., opium, ½ dr., powdered ginger, 1 dr., liquorice powder, 3 dr. formed into a ball for one doſe: 3. Salt of ſteel, ½ oz., myrrh, 2 dr., ginger, 1 dr. made into a ball for one doſe: 4. Powdered Columbo-root, 3 dr., caſcarilla, 2 dr., ſalt of ſteel, 2½ dr., prepared kali, 1½ dr., and tincture of opium, ½ oz.; the ſeveral ingredients to be mixed with ſtrong beer, or porter, and given as a drink at once. He obſerves, that the horſe's diet ſhould be nutritious, and eaſy of digeſtion; and that he ſhould be allowed to drink ſmall quantities of weak lime-water; or, if he refuſe this, common water, frequently. Mr. Taplin, in his "Stable Directory," recommends the following drink: "Take jeſuit's bark, 4 oz., biſtort and tormentil roots, of each 2 oz.; boil them in two

 gallons

gallons of lime-water to the confumption of one-half, and give a pint of the liquor three times a day. As this diforder generally proceeds from too violent exercife, overftraining, &c. repeated bleedings in fmall quantities are abfolutely neceffary, till the mouths of the veffels clofe up.

Diabetes, in *Hydraulics*, is applied to a fyphon, the two legs or branches whereof are inclofed in one another; as in the glafs defcribed by Hero, which runs itfelf quite empty, without being inverted, as foon as the water is arrived at the height of the upper branch of the fyphon.

DIABLINDI, in *Ancient Geography*, a people of Gaul, fituated between the Redones on the weft, and the Aulerci on the eaft. Their capital was Nœodunum.

DIABOLUS Marinus. See *Sea*-Devil.

DIABOTANUM, from δια and βοτανη, *herb*, in *Pharmacy* and *Chirurgery*, denotes a plafter of herbs, wherewith wens, &c. are refolved and difcuffed. The diabotanum is fovereign for the hydatides.

DIABROSIS, in *Medicine*, a term ufed by the older writers to denote a rupture of the veffels, in confequence of the corrofion of acrid humours. It is derived from δια and βρωσις, *erofion*. Thus an hæmoptyfis, or difcharge of blood from the lungs, was faid to take place in feveral ways, as by a violent rupture of the veffels, by a dilatation of their orifices, and by a diabrofis, when the veffels were corroded by the acrimony of the fluids. Vogel has conftituted a genus of difeafe, in his nofology, under the title of diabrofis, and defines it, "an erofion of the fkin by an acrid matter, either internal or external." See his Genera Morbor. clafs x. Ord. 6.

DIACARYON, or Dianucum, in *Pharmacy*. See Dianucum.

The word is formed from δια, and καρυα, walnut.

Galen is faid to have prepared his diacaryon with the juice of walnuts, mixed with as much honey as fufficed to render it an agreeable compofition.

DIACAUSTIC Curve, or *Curve by Refraction*. See *Cauftic* Curve.

DIACENTROS, from δια, *through*, and κεντρον, *centre*, in *Aftronomy*, is ufed by Kepler to fignify the fhorteft diameter of the elliptical orbit of any planet; probably becaufe it paffed through the centre, and not through the focus, which diftinguifhes it from the longer diameter.

DIACHALASIS, from διαχαλαω, *to be relaxed*, in the *Medicinal Works of the Ancients*, a term ufed to exprefs a folution of continuity in the bones of the cranium at the futures; that is, when the bones recede from their mutual indentation; an accident that frequently happens from large wounds in the head.

DIACHALCYTES, in *Pharmacy*, the name of a plafter. See Emplastrum.

DIACHER, in *Geography*, a town in Perfia, in the province of Mazanderan; 24 miles S. W. of Zaeveh.

DIACHERSIS, in *Ancient Geography*, a town of Africa, in the Cyrenaica, where the Romans had a garrifon.

DIACHRISTA, from δια and χριω, *I anoint*, a name given by the ancient writers in medicine to certain compofitions, whofe ufe was to be applied to the fauces, uvula, palate, and tongue, for the abfterfion of phlegm.

DIACHYLON, in *Surgery*, a fpecies of plafter, now called litharge plafter by the college of phyficians. It is one of the moft fimple and emollient applications adapted for the refolution of indurated fwellings. See Plaster, and Litharge.

DIACODIATE, in the older writers on *Medicine*, fynonymous with narcotic, or opiate, from δια and κωδεια, the *poppy-head*, or capfule. See Van Swieten.

DIACODIUM, in *Pharmacy*, the name of a fyrup, the principal ingredient of which is the white poppy-head, and which poffeffes much of the anodyne property of this plant. The fyrupus diacodion was made in the following way: Take of white poppy heads and of the feeds, of each two ounces, of cubebs two ounces and a half; cut them into fmall pieces, and boil them flowly with a pint and a half of water, till only ten ounces of liquor remain, adding towards the end of the coction an ounce and a half of liquorice root. Collect the liquor, by ftrongly fqueezing the ingredients through a coarfe cloth, and diffolve therein fixteen ounces of fine fugar, or, as fome advife, of brown fugar-candy, and ftrain and defpumate the fyrup in the ufual way.

A variety of the diacodium is made by adding a dram of faffron to the above quantity of the fyrup.

The diacodium is a medicine of very confiderable value, being a weak opiate, which appears to produce very little of the inconvenience which opium in fubftance occafions. It is particularly ufeful in various difeafes of very young infants, and its pleafant tafte is no fmall additional advantage. To adults, its opiate properties are hardly powerful enough to fuperfede the opium in fubftance or in tincture.

As the fimple fyrup of poppies appears to poffefs all the virtues of the diacodium, it is now very generally fubftituted to it, and the diacodium is now omitted in our pharmacopœias.

DIACODUS, in *Natural Hiftory*, a name given by fome to the diadochos, a kind of beryl or fapphire, of which many fabulous things are afferted.

DIACOLOCYNTHUS, in *Pharmacy*, an electuary, in which colocynth is the principal ingredient. It is now difufed.

DIACOMMATIC, in *Mufic*, has fometimes been ufed to exprefs the frequent temperaments of a whole comma major in the melody, which are neceffary for enabling the different parts of a piece of mufic always to make perfect harmony with each other. See Dr. Callcott's Mufical Grammar, p. 136.

DIACONICON, Sacristy, a place adjoining to the ancient churches, where the facred veftments, with the veffels, relics, and other ornaments of the altar were preferved, and anfwering to our veftry.

The word is Greek, formed from διακονεω, *I ferve, I minifter*, becaufe here was kept every thing belonging to divine fervice. It was alfo called ασπασικον, and in Latin falutatorium; becaufe it was here that the bifhop received and faluted ftrangers. Sometimes, too, it was called μητατωριον, or μιτατωριον, *menfa*, on account of the tables kept therein, for difpofing the facred ornaments on; or rather from μητατον, a fort of inn, or houfe, for the lodging of foldiers.

DIACONISSA, and Diaconate. See Deacon, and Deaconry.

DIACOPE, Διακοπη, from δια and κοπτω, *I cut off*, in *Grammar*, the fame with what is otherwife called tmefis.

Diacope, in *Surgery*, denotes a deep cut or wound; or the act of cutting off any part.

DIACOPENA, in *Ancient Geography*, a country placed by Strabo in Afia Minor, between the rivers Halys and Iris, near the country which he calls *Pimolefina*.

DIACOPTON, a city of Achaia Propria, about 60 furlongs diftant from the gulf of Corinth; formerly called *Pellene*, or *Pellina*.

DIACOUSTICS, (from δια, *through*, and ακουω, *I hear*;) alfo

alſo called *diaphonics*, is the name of the ſubject of refracted ſound, or that branch of acouſtics, which conſiders the paſſage of ſound through different mediums. See ACOUSTICS, and SOUND

DIACRII, in *Antiquity*, was the name of a party or faction at Athens.

That city, we read, was divided into two parties: the one favourers of an oligarchy, who would only have a few perſons employed in the government. The other conſiſted of ſuch as were for a democratical, or popular government, wherein the whole people ſhould have a ſhare. The firſt were called diacrii, and the latter pediaci; the latter inhabiting the lower, and the former the ακρον, or upper quarter, or part of the city.

The laws of Solon imported, that Piſiſtratus ſhould be chief of the diacrii; though the ſcholiaſt on Ariſtophanes's comedy, "The Waſps," affirms, that Pandion diſtributed the quarters of the diacrii among his ſons, and put Lycus at their head.

DIACTORE, in *Mythology*, a ſurname of Mercury; derived from διαγω, *I attend*, becauſe Mercury was the meſſenger of the gods.

DIACUM, in *Ancient Geography*, a town of Lower Mœſia, near the Danube. Ptolemy.

DIACYDONIUM, in *Pharmacy*, is a preparation of the decoction of quinces and ſugar, hardly differing from the marmalade of the confectioners. This, when uſed with jalap, forms the *diacydonium jalappinum*, and with ſeveral aromatics the *diacydonium aromaticum* of ſome of the foreign diſpenſatories. It is entirely diſuſed in this country.

DIADELPHIA, in *Botany*, (from δις and αδελφος, a *twofold brotherhood*) the ſeventeenth claſs of the ſexual ſyſtem of Linnæus, conſiſting of plants whoſe ſtamens are united by their filaments into two ſets or parcels. The number of ſtamens may be either equal in each ſet, as in *Fumaria*, *Smithia*, and a few other plants; or unequal, as in the greater part of this claſs, whoſe ſtamens are commonly nine in one ſet, and a ſolitary one in the other. The baſes of each parcel may alſo be quite ſeparate to the very bottom, or united to a greater or leſs diſtance upwards. Such is the ſtructure of truly diadelphous flowers; but as the claſs is almoſt entirely a natural one, compriſing the papilionaceous family, Linnæus did not confine himſelf to the above ſtrict definitions, but admitted into it alſo ſuch papilionaceous plants as have their filaments all united into one ſet, with a longitudinal ſlit indeed on one ſide in ſome caſes, and ſome difference of ſize or figure in the tenth ſtamen in others, evincing a natural affinity to the bulk of the claſs. In this Juſſieu has followed him, even without making any particular ſubdiviſion for ſuch anomalies, but ranging them all as diadelphous. The plants of this claſs are in general wholeſome to the larger tribes of animals; their ſeeds, called pulſe, are in many inſtances important articles of food, and when boiled are, in every caſe, as far as we know, eatable with ſafety, though many of them too bitter to ſerve as food. Laburnum ſeeds, in a raw unripe ſtate, have been found violently emetic. Some ſpecies of *Galega* are uſed by the negroes to intoxicate fiſh, ſo that they may be caught by the hand. In general the herbage of the diadelphous plants affords the moſt copious and wholeſome fodder for domeſtic cattle, comprehending moſt of what agriculturiſts call artificial graſſes. See GRASS, PAPILIONACEOUS and LEGUMINOUS. S.

DIADEM, Διαδημα, in *Antiquity*, a head-band, or fillet, worn by kings as a badge of their royalty; while the crown was left to the gods.

The word comes from the Latin *diadema*, of the Greek διαδημα, *a little band encompaſſing the head*, of the verb διαδεω, *cingo*, *I gird*.

The diadem, or *vitta*, was a ſort of ribbon, or fillet, woven of ſilk, thread, or wool, more or leſs broad. It was tied round the temples, and forehead; the two ends being knotted behind, and let fall on the neck.

It was uſually white, and quite plain, though ſometimes embroidered with gold, and ſet with pearls and precious ſtones. In later times it likewiſe came to be twiſted round crowns, laurels, &c. and even appears to have been worn on divers parts of the body; thus Phavorinus obſerved, that Pompey was ſuſpected of aſpiring to the royalty, becauſe of his wearing a white garter, which was no other than a ligature for an ulcer he had on his leg, but which the people miſtook for a diadem.

Pliny, lib. vii. cap 5. obſerves, that Bacchus was the firſt inventor of the diadem. Athenæus aſſures us, that the topers, and good fellows, firſt made uſe of it, to preſerve themſelves from the fumes of wine, by tying it tight round their heads; and that it long afterwards came to be a royal ornament.

The diadem remained a long time the peculiar badge of kings; and it is obſervable upon the Greek monarchic medals from the earlieſt ages to the laſt; ſo that it is almoſt an infallible ſign of the portrait of a prince. On the Roman coins it is ſeen on the conſular ones with Numa and Ancus; but never after, as Mr. Pinkerton ſuppoſes, (Eſſ. on Medals, vol. i.) till the time of Licinius. So great was the averſion of the Romans to this kingly diſtinction, that their emperors had, for more than two centuries, worn the radiated crown, peculiar to the gods, before they dared to aſſume this tyrannic badge. At length, however, the diadem was aſſumed by the Roman emperors, as the mark of imperial dignity: but authors are not agreed about the time when they firſt aſſumed it. Some refer it to Caligula, others to Aurelian, and others to Conſtantine the Great. The younger Victor ſays, poſitively, that Aurelian took the diadem, which no emperor had dared to do before him. For though it ſhould ſeem from the ſame writer, that Caligula had done the like, yet Suetonius aſſures us, he had it only in view, and that he never executed it. Heliogabalus, indeed, took a diadem; but it was only in the palace he wore it, and never appeared with it in public. Jornandes even goes as low as Diocleſian, for the introduction of the diadem; but it is aſſerted there is a medal of Aurelian, with a crown like one of our ducal crowns, which is ſuſtained by a border of pearls, that bears a very great affinity to a diadem. And the authors, who have explained that medal, are all agreed that it is one. Mr. Spanheim alſo allows Aurelian to have taken it; his ſucceſſors imitated him therein; and yet the ornament did not become common till the time of Conſtantine, when it had loſt its ancient ſimplicity, being ornamented on either edge with a row of pearls, and various other decorations. After him, it is ſaid, that the empreſſes were allowed to wear it: and that they are found repreſented with them on medals; though till that time we have no inſtance either of crown, or diadem, on a woman's head, in all the Roman empire. Mr. Pinkerton (ubi ſupra) affirms, that though the Greek queens have the vitta, or diadem, the Roman empreſſes never appear with it; but the variety of their head-dreſſes more than compenſates the want of this ornament.

An author of the fifth century, quoted by Bollandus, pretends that Conſtantine firſt wore the diadem, and that he only took it to bind his hair and keep it in order. But this is not very probable; and it is certain, that at leaſt ſome emperors had worn it before him, as Aurelian and Carinus.

Euſebius gives it to Conſtantius Chlorus, when only Cæſar; which is confirmed by one of his medals, wherein he is

is reprefented with a diadem, adorned with rays: though even after Conftantine, when the diadem was become the ufual ornament of the Augufti, it was not always given to the Cæfars. Indeed, we fee it on fome of the medals of Julian, while only Cæfar; though it is pretty certain, he did not wear it until he became Auguftus. Du-Cange will not affert, that Conftantine firft took the diadem; but only, that he firft made it into a kind of cafk, or clofe crown, as is feen in fome of his medals, and thofe of his fucceffors.

Diadem, in *Heraldry*, is applied to certain circles or rims, ferving to bind or enclofe the crowns of fovereign princes; and to bear the globe, and crofs, or the fleurs de-lis, for their creft.

The crowns of fovereigns differ in this, that fome are bound with a greater, and fome with a lefs, number of diadems.

Prelates likewife appear to have anciently worn a fort of diadem; thus Baronius writes, that St. James the apoftle wore a gold plate on his forehead, as a mark of his epifcopal dignity.

In blazoning, the bandage about the heads of Moors, on fhields, is fometimes alfo called diadem. The term *diademed* is applied to the imperial eagle, the two heads of which are furrounded with an annulet or circle, which is a token of greater dignity than to be *crowned*, as the eagles of other princes are.

DIADES Athenæ, in *Ancient Geography*. See Dia.

DIADOCHUS, in *Natural Hiftory*, the name given by the ancients to a gem, approaching to the nature of the beryl, or aqua-marina, probably a pale fapphire; for they had no peculiar generical name for that gem, but called the beautiful deep coloured ones only fky-blue beryls, berylli aeroides. The writers of the middle age have given ftrange accounts of the magical virtues of this ftone, fuch as its calling up fpirits, and many other the like things, on being thrown into water: they faid, however, that if it happened by any accident to touch a dead body it loft all its virtue.

DIADOCOPOTIS, in *Ancient Geography*, a town of Afia, in the Perfide. Steph. Byz.

DIADROME, from δια and δρομος, *curfus*, is fometimes ufed for the vibration, motion, or fwing of a pendulum.

DIÆRESIS, in *Grammar*, is a figure whereby a diphthong is divided into two fyllables: as aulæ into aulai, pictæ into pictai, aquæ into aquai.

Diæresis is alfo ufed, in a general fenfe, for any divifion of one fyllable into two: as in that verfe of Tibullus, "Stamina non ulli diffoluenda deo," for diffolvenda.

This is ufually noted by two points placed over a letter, to fhew that it is to be founded by itfelf, and not joined with any other fo as to make it a diphthong: thus *aëra*, by the points over the *e*, is diftinguifhed from *æra*.

It is alfo a kind of metaplafm, or addition to a word, by dividing one fyllable into two: as aulae, by a diærefis, is a word of three fyllables, inftead of aulæ. See Tmesis.

Diæresis, in *Surgery*, the operation of dividing and repairing parts, whofe union and continuity were an obftacle to the cure; or which were joined and conglutinated contrary to the order of nature.

The word, in its original Greek, διαιρεσις, fignifies divifion.

There are five ways of performing the diærefis, *viz.* by cutting, pricking, tearing, drawing, and burning.

DIÆTETÆ, Διαιτηται, from διαιταω, *I arbitrate*, among the Athenians, were of two forts, the clerοti and dialacterii. The former were a kind of public arbitrators, chofen by lot, to determine all caufes exceeding ten drachms within their own tribe. Their office was annual, at the expiration of which they were obliged to give up their accounts; and if it was proved, that they refufed to give judgment, or to have been corrupted, they were punifhed with infamy. Their fentence, however, was not final, an appeal lying from it to the fuperior courts.

The dialacterii, on the contrary, were private arbitrators, from whofe fentence there lay no appeal; and accordingly they always took an oath to adminifter juftice, without partiality, which the cleroti did not. Potter's Archæol. Græc. lib. i. cap. 22. tom. i. p. 122, feq.

DIAFERI, in *Geography*, a town of Perfia, in the province of Chorafan; 135 miles N. of Herat.

DIAGEBRES, in *Ancient Geography*, a people of the ifland of Sardinia, according to Strabo.

DIAGLAUCIUM, a name given by the old writers on *Medicine* to a fort of collyrium, in which the juice of the glaucium, or yellow poppy, was a principal ingredient. It was ufed for beginning lippitudes and ophthalmies.

DIAGLYPHICE, from διαγλυφω, *I engrave*, the art of engraving, cutting, or otherwife working, hollow or concave figures, in metals; fuch as feals, intaglios, matrices for coins or medals, &c. See Sculpture.

DIAGNOSIS, in *Medicine*, from δια and γινωσκω, *I know*, the diftinction of the nature of one difeafe from that of another, refembling it, by means of a collected view of the fymptoms; whence

DIAGNOSTIC Symptoms, are the leading fymptoms, or thofe which are moft characteriftic of any particular form or feat of difeafe. Thus cough, difficulty of breathing, pain in the cheft, and fever, are the diagnoftic fymptoms of pleurify. If any one of thefe is abfent, the remaining three are not fufficient to denote inflammation of the cheft. From the various combinations and degrees of the fymptoms of difeafe, it is obvious that the knowledge of diagnoftics is one of the moft important and difficult branches of the fcience of medicine; and it is the poffeffion of this knowledge by which the judicious phyfician rifes fo far fuperior to the empiric.

DIAGONAL, in *Geometry*, a right line drawn acrofs a parallelogram, or other quadrilateral figure, from the vertex of one angle to that of another.

Such is the line P N (*Plate* VI. *Geometry*, *fig.* 75.) drawn from the angle P to N.

Some authors call it diameter, and others the diametral of the figure.

It is demonftrated, 1. That every diagonal divides a parallelogram into two equal parts; for the oppofite fides, O P, N Q, and O N, P Q, being parallel (*fig.* 75.) and the alternate angles Q N P, O P N, and Q P N, P N O being refpectively equal, and the fide N P, common to the equiangular triangles O P N, P N Q, thefe triangles are equal. 2. Two diagonals drawn in any parallelogram, bifect each other, for the triangles O M P, N M Q, being equiangular, and having N Q = O P, will have N M = M P, and O M = M Q. 3. The diagonal of a fquare is incommenfurable with one of its fides.

Add, 4. A very noble theorem in elementary geometry, firft demonftrated by Mr. Lagny, in the Memoirs de l'Academie Royale des Sciences, an. 1706, is that the fum of the fquares of the two diagonals of every parallelogram is equal to the fum of the fquares of the four fides.

It is evident at firft fight, that the famed 47th propofition of Euclid, fo richly worth the hecatomb it coft the author, is only a particular cafe of this propofition: for if the parallelogram be right-angled, it follows of courfe, that the two diagonals are equal; and of confequence, the fquare of a diagonal, or, which is the fame thing, that the fquare of the hypothenufe of a right angle, is equal to the fquares of the two fides. If a parallelogram be oblique-angled, and of confequence, the two diagonals unequal, as is the more ufual cafe, the propofition becomes of more extenfive ufe.

The demonftration, in oblique-angled parallelograms, is thus:

thus: fuppofe the oblique-angled parallelogram A B C D (*fig.* 76) whereof BD is the greater diagonal, and A C the leffer: from the point A, of the obtufe angle D A B, let fall a perpendicular AE, to the fide CD; and from the point B another perpendicular BF to the fide DC. Then are the triangles ADE, BCF, equal, and fimilar, as AD is equal to BC, and the angles ADE, BCF, as well as AED, BFC, are alfo equal; confequently, DE is equal to CF. Now by Euclid, prop. 13. lib. ii. in the obtufe-angled triangle BDC, the fquare of the fide BD is equal to the fum of the fquares of BC and CD, together with double the rectangle of CF by CD; and by the 13th, lib. ii. in the triangle DAC, the fquare of the fide AC is equal to the fum of the fquares of AD, and CD, abating double the rectangle of the fame, CD, by DE, equal to CF. Confequently, the former excefs precifely compenfating this defect, the fum of the fquares of the two diagonals is equal to the fum of the fquares of the four fides. *Q. E. D.*

Hence, in every rhombus, or lozenge, knowing one fide and a diagonal; the other diagonal will likewife be known: for, as the four fides are equal, fubtracting the fquare of the given diagonal from quadruple the fquare of the given fide, the remainder is the fquare of the diagonal required.

The propofition is likewife of great ufe in the theory of compound motions; for, in an oblique-angled parallelogram, the greater diagonal being the fubtenfe of an obtufe, and the leffer of an acute angle, which is the complement of the former, the greater will be the greater, and the lefs the lefs, as the obtufe angle is the greater: fo that if the obtufe angle be conceived to increafe till it be infinitely great, with regard to the acute one; or, which amounts to the fame thing, if the two contiguous fides of the parallelogram be extended directly, end to end, in a right line, the great diagonal becomes the fum of the two fides, and the leffer one, nothing. Now, two contiguous fides of a parallelogram being known, together with the angle they include, it is eafy to find the fubtenfe of that angle, *i. e.* one of the diagonals of the parallelogram, in numbers; which done, Mr. de Lagny's propofition gives the other. Which fecond diagonal, thus found, is the line that would be defcribed by a body impelled at the fame time by two forces, which fhould have the fame ratio to each other as the contiguous fides have, and act in thofe two directions; which diagonal the body would defcribe in the fame time, as it would have defcribed either of the contiguous fides in, if only impelled by the force correfponding thereto. This is one of the great ufes of the propofition; for the ratio of two forces, and the angle they make, being given, it is frequently neceffary to determine in numbers, the line a body, impelled by two forces, would defcribe in a certain time. See COMPOSITION *of Motion,* and DYNAMICS. It was difcovered by Ptolemy, that the rectangle of the two diagonals of any quadrilateral infcribed in a circle, is equal to the fum of the two rectangles contained under the oppofite fides: for the demonftration of this property, fee CIRCLE; art. 15.

All the fides of a rectilinear figure, as A B, B C, C D, D E, E A (*fig.* 77.) and the angles O, and Y, being given to find the diagonals. In the triangle A B E, the fides A B, and A E, being given, and the angle O, the angle A is eafily found by trigonometry; and, from this, the diagonal B E. And, after the like manner, the triangle B C D is refolved, and the diagonal B D found.

Since ichnographies, or plans, are beft taken, by having all the fides and diagonals, the ufe of this problem, in planimetry, is of fome importance; efpecially to fuch as are willing to have their work accurate, though at the expence of calculation.

DIAGONAL *Motion.* Application of two, and three forces, in different planes, to produce every diverfity of rectilinear and curvilinear motion by the agency of machinery.

In moft machines commonly ufed, the motions are either rotatory or reciprocating. Even the latter motion is feldom ufed, unlefs where the defired effect cannot be produced by the rotatory movement. In fitting machines to fuperfede, or diminifh the neceffity of human labour, mechanics have, as much as poffible, ftudied to reduce the reciprocating to the rotatory motion, wherever it appeared practicable. The cylindrical cards of an engine for carding wool or cotton, the barrel organ, and many other machines, are convincing proofs of this; and the reafon of this preference is very obvious to every perfon at all converfant with the theory or practice of mechanics. In every reciprocating motion, the direction is fo frequently reverfed, that the inertia, or vis inertiæ, as it is commonly called, muft always produce a very confiderable effect upon the momentum of the machine, and tend very much to impede its motion and diminifh its power. Perhaps, after all the improvements for which mankind are indebted to Mr. Watt, in the conftruction of fteam-engines, this is ftill the principal defideratum, in that moft ufeful and valuable machine. In rotatory motions, on the contrary, the movement being uniformly round a centre, the inertia, fo far from impeding, tends always rather to increafe the momentum, and confequently, the power of the engine. Hence, where reciprocating motions are abfolutely neceffary, the rotatory motion is generally combined with them, and fly or balance-wheels added to counteract the inequalities of power, and velocity produced by the inertia, while the direction of the motion is changed. But the rotatory movement is too limited in its operation to produce the infinite combination of motions of which machinery is fufceptible, and the reciprocating motions generally employed are moft frequently confined to one direction. In the adaptation of machinery for the diminution or fuperfeffion of labour, thofe machines are firft conftructed, where the mechanical powers may be applied in great force. Hence, in infant ftates, cranes, water-mills, and fuch engines are fooner fought for than clocks, watches, and other mechanical contrivances, more particularly fuited to a refined ftate of fociety.

The motions which may be given to any piece of machinery are infinite, and the lines of direction in which the particular parts of the machine move, may be changed as often as the artift is inclined to do fo. The following remarks, which are the refults of a very long train of practical, and ultimately fuccefsful experiments, may be of fome ufe in directing the attention of mechanics to the conftruction of a fpecies of machinery, hitherto not generally known, or ufed in Britain; and only applied by thofe foreigners who have practifed it to purpofes of mere fpeculative and unproductive curiofity. The purpofe for which the experiments were made, was to enable one perfon to work any given number of needles, for making flowers and other ornaments upon cloths, of various kinds, by the procefs called tambouring. It is, however, equally fuitable to any other art or manufacture where diverfified motion is required.

The theorem upon which the principle is founded, is thus expreffed in the 1ft and 2d corollaries to the 5th law of motion, as given in Mr. Motte's tranflation of the Principia of fir Ifaac Newton. "Corollary 1ft. A body, by two forces conjoined, will defcribe the diagonal of a parallelogram in the fame time that it would defcribe the fides by thefe two forces apart. Corollary 2d. And hence is explained the compofition of any one direct force out of any two oblique forces; and, on the contrary, the refolution

of

of any one direct force into any two oblique forces; which composition and resolution are abundantly confirmed from mechanics. Upon this principle, that eminent philosopher demonstrated the elliptical orbits described by the planets round the sun, and the subject has since been most amply investigated and carried much farther by Monf. La Place.

To apply the principle to the construction of any machine which requires the line of motion to be frequently, or incessantly changed, it is only necessary to use either two or three moving powers acting at the same time upon the body to be moved in different planes. For the sake of conveniency it will, in general, be found most advantageous that these planes should be at right angles to each other. Consequently, if two forces are employed, they will be in the direction of two sides of a square or parallelogram; and if three are necessary, they will be in the direction of three sides of a cube, each side being at right angles to either of the others. The first of these is represented by *fig.* 12 *Plate* V. *Miscellany*. If two forces be applied at the same time to move a body at B, and act upon it in the directions of the lines B C, B A, and if these moving powers produce equal velocity, the body at B will be moved by their joint application in the direction of the diagonal line B E, forming an angle of 45° with each of the lines B A, B C. If the force moving in the direction B C gives double the velocity of that which moves in the direction B A, the line, B D, will be described forming an angle of 36° 34′ with B C, and one of 63° 26′ with B A nearly, the latter being the complement of the former. From this it will be evident, that by varying the velocity given by the moving powers, every angle contained in the quadrant of a circle will be produced as may be required.

To effect this practically, and apply rotatory motions to produce such lines of direction on the body moved, whether direct or reciprocating, two wheels, moving upon the same or different axes, are all that is required. Let it be supposed, that one of the two forces, moving at right angles to each other, is in a horizontal, and the other in a vertical direction. The first of these motions will be produced by the rotatory motion of the wheel, A, (*fig.* 13.) upon its axis B, and the horizontal motion will be communicated to the body C, which presses against the circumference or rim of the wheel by the action of the weight E, suspended by a cord connected with C, and passing over the pulley D. The vertical motion is communicated in the same manner, by the rotation of the wheel, A, upon its axis, B, (*fig.* 14.) to the same body, C, by means of the lever, F, moving upon its fulcrum G, or any other similar mechanical contrivance. If the wheels are placed upon the same axis, the combined application of their powers will be seen by inspecting *fig.* 15. In *fig.* 14, the lever, F, is placed below the vertical wheel, in *fig.* 15. it is above, and acted upon by means of a cord, wire, or other connection, between the wheel, A, and the body C, upon which it acts. These figures being profile elevations, and the wheel which gives the vertical motion being upon the same axis with that which produces the horizontal, must be supposed to be behind and concealed by it. *Fig.* 16, shews the axis in front, and the wheels in section.

The operation of these wheels, to produce either uniform, or diversified motion, depends entirely upon the shapes into which their circumferences or rims are formed, and a knowledge of the manner of performing this operation, is the most important part of the business of the engineer, or mechanic, who plans them. Recurring to *fig.* 12, let it be supposed that in one revolution of the axis which carries the two wheels, the body acted upon is required to move from B to E, and again to return to B, describing in both cases the diagonal line B E. In this case the whole line of motion, forming an angle of 45° with the lines of each of the moving powers, their momenta must be equal. If the motion may, or ought to be, communicated at intervals, the wheels should be constructed as a series of concentric circles. In this way the wheel, A, (*fig.* 13.) is represented. It is divided into 12 equal parts, of which 1 and 12 are upon the same circle, or equally distant from the centre. From 1 to 6 the concentric circles approach towards the centre, the radius of each in succession being less than that of the one preceding. From 7 to 12 the radii again increase to produce the returning motion upon the body C. Let C be a square frame of any stout substance, so placed, or suspended, as to move freely, either in a horizontal or vertical direction, and let a piece of paper or cloth be stretched upon it. Let there be also a fixed instrument placed at right angles to the plane of the frame (as a pencil), the point being in contact with the paper or cloth. Then, if the wheel, A, revolves upon its axis towards the body C, when the intermediate friction-wheel, H, is pressing against the division 1, the point will be at I, and when the division 6 is in contact with the friction-wheel, the point will be at L, from whence, by the revolution of the other semi circumference of the wheel from 7 to 12, it will be again at I. As represented in the figure the point would be half way between I and L, for the friction-wheel presses the division 3. By these means the horizontal motion is effected. The wheel which gives the vertical motion to the same body would, by a revolution in the same way, bring the point from I to M, (*fig.* 14.), and again return it to I. Such would be the effect of each of the wheels acting separately; but if their action is combined, the diagonal line, I K, will be produced by the pressure of the point, and the motion of the frame C. It will be evident, that were the frame, C, stationary, and the point moved in the same direction by the action of the two wheels, the same effect would be produced; or the horizontal motion might be communicated to the one body, and the vertical to the other. The application of the moving power, therefore, is only a matter of practical conveniency, which may vary in different machines, and which, as it does not at all affect the general principle, must be left to the discretion of the engineer, and regulated by him as particular circumstances may render expedient. The combined motion is represented, as already noticed in *fig.* 15, the vertical wheel being there concealed by the horizontal.

In these figures, the divisions are equal, because the angle is 45°, and the motion would only be communicated to the body C, at the instant when the friction-wheel, H, comes in contact with each division. But if incessant motion be required, the deviation must be constant, and then the wheel will act like inclined planes applied to a circle.

In the machinery to which these experiments were applied, a great diversity of figures was required, and these figures were often very minute. As the approaching to, or receding from, the centre of each wheel required to be done with greater accuracy than could be expected from the hand of any workman, an engine was contrived, similar, in some respects, to that of Mr. Ramsden, for dividing mathematical instruments, and which shall afterwards be described.

If, instead of the line B E, it is required to describe the line B D, it will be necessary that the descents and ascents, which produce the vertical motion, should be less than those which give the horizontal; and by the common principles of right-angled trigonometry, these will be to each other in the ratio which the base line B C, bears to the perpendicular line C D, these being the sines of the opposite angles. In the same way, every angle of the quadrant of a circle ought

ought to be calculated, and applied by the engineer to the effect which he intends to produce. The length, intended to be given at every interval, in the machinery constructed, was $\frac{1}{32}$d, or .03125 of an inch. In the dividing and cutting-engine for the wheels, this was represented by the number 18, being the revolutions of a handle which effected the divisions upon the rim of the wheel. When a horizontal motion was required, the wheel producing the vertical motion was made circular, so as to produce no effect upon the body to be moved. If vertical, the same was done with the horizontal wheel; and when oblique, a deviation from the circle was given to each, proportional to the angle of obliquity from a horizontal straight line. Thus, the horizontal motion represented the base; the vertical motion the perpendicular; and the combined oblique motion the hypothenuse of a right-angled triangle. As each of these must be made equal to $\frac{1}{32}$d of an inch, represented by the number 18, it became necessary to ascertain the ratio which the hypothenuse, whose measure was 18, bore to the base and perpendicular for every degree of a quadrant from 0° to 90°. Minutes and seconds were not reckoned, as being unnecessary, and the nearest degree, above or below, was taken. The table, calculated by the common trigonometrical analogies, making the hypothenuse radius was as follows:

Table I. shewing the length of the base and perpendicular of any right-angled triangle, the measure of the hypothenuse being 18, and calculated for every degree, from 0° to 90°.

	Base	Perp.			Base.	Perp.	
0	18.0	0.0	90°	23	16.6	7.0	67
1	18.0	0 3	89	24	16.5	7.3	66
2	17 9	0.6	88	25	16.3	7.6	65
3	17.9	0 9	87	26	16.2	7.9	64
4	17.9	1.2	86	27	16.0	8.2	63
5	17.9	1.5	85	28	15.9	8.4	62
6	17.9	1.8	84	29	15.7	8.7	61
7	17 9	2.2	83	30	15.6	9.0	60
8	17.8	2 5	82	31	15.4	9.3	59
9	17 8	2.8	81	32	15.3	9.5	58
10	17.7	3 1	80	33	15.1	9.8	57
11	17 7	3.4	79	34	14.9	10.1	56
12	17.6	3.8	78	35	14.7	10.3	55
13	17.5	4.1	77	36	14 6	10.6	54
14	17.5	4.4	76	37	14.4	10.8	53
15	17.4	4.7	75	38	14.2	11.1	52
16	17.3	5.0	74	39	14.0	11.3	51
17	17.2	5.3	73	40	13.8	11.6	50
18	17.1	5 6	72	41	13.6	11.8	49
19	17.0	5.9	71	42	13.4	12.0	48
20	16.9	6.2	70	43	13.2	12.3	47
21	16 8	6.5	69	44	13.0	12.5	46
22	16.7	6 7	68	45	12.7	12.7	45
	Perp.	Base.			Perp.	Base.	

The above table, calculated to every degree, from 0° to 90°, is adapted for cutting the rims of wheels for producing diagonal motion, to the 5760th part of an inch, by means of the engine afterwards described. The angles above 45° are the complements of those below, as in common logarithmic tables.

Fig. 17, shews the angles of obliquity for every 10°. The base line, or horizontal motion, there becomes the co-sine, and the perpendicular, or vertical motion, the sine of the angles at the centre A of the quadrant B C. The triangles are represented by the radii, the base, and the perpendiculars drawn from the divisions of the quadrant to the base, and numbered from 1 to 8.

The general principle being thus reduced to the common application of right-angled trigonometry, it may now be proper to describe the cutting-engine, which is, probably, the only one of the kind in Britain, and of which representations will be found in *Plate* VI.

Dividing and Cutting Engine.

This engine, as formerly noticed, is, in some respect, similar to Mr. Ramsden's dividing engine. It also combines with this the properties of the common engine used by clock-makers for cutting the teeth of their wheels, excepting that, as constructed, it is not adapted for cutting oblique wheels, although the apparatus used for this purpose might very easily be added to it, if required. The engine made was entirely confined to the purpose of shaping the rims of such wheels as have been already noticed, and never was applied to the purposes for which the common cutting engine is used. In *Plate* VI. *fig.* 18, is a ground, or horizontal plan, of every part of the engine which can be seen, when viewed from above, excepting some of the higher parts, which are omitted, for the sake of shewing more distinctly the parts under them. The parts omitted in *fig.* 18, appear very plainly in the profile elevation, *fig.* 19. The length of the engine is four feet, and its breadth three feet, although these dimensions ought, of course, to be varied, according to the diameters of the wheels required to be cut, by any engine constructed for a similar purpose. The diameters of the wheels cut by this engine were 18 inches at the most remote point from the centres.

Like the common engine, this cuts by the revolution of a circular cutter upon its own axis; and as the cutters were thick (generally $\frac{1}{2}$ or $\frac{5}{8}$ths of an inch) the motion was taken from a shaft driven by the steam-engine, which also drove the rest of the machinery. In smaller wheels, and where less power is required, the motion may be given by turning a winch applied to one end of the axis. The framing is of hard wood, four inches square, and the joints fastened by screws and nuts. The upper part of this framing is represented at ABCD. To this upper part are screwed four pieces of iron, G, G, G, G, which serve as supporters and guides for the iron frame E E; so that the frame may slide easily between them in a longitudinal direction. To one end of the wooden frame is screwed a strong piece of iron H, in which is a round hole to serve as a bush for the neck of the screw, which, passing through the iron frame at I, has its other end supported by another fixture to the wood work at K. The end of the large screw is countersunk to receive the point of a smaller screw passing through the fixture at K, which may be screwed up, when necessary, to keep the shoulder of the large screw close to the bush, H, in which it revolves. When the screw is turned round from right to left, the iron frame, working upon the screw at I, will be pushed forward between the guides; and when the motion of the screw is reversed, it will be again drawn back. Upon the end of the screw is fixed a large wheel, L, which is worked by a worm or spiral screw below, a small part of which only can be seen at M, in *fig.* 18, but which appears very plainly in the profile elevation of the engine, *fig.* 19, and the perspective view, *fig.* 20. The worm is fixed upon an iron axis, stretching across the engine supported at either end by bushes screwed to the wood, and turned by the winch, or handle, N. Upon the axis is another smaller wheel, represented at N, the use of which shall be explained, when

when the ratio of motion comes to be deſcribed. Upon the frame, E E, are two upright pieces of iron, F, F, through which paſs two centre ſcrews to ſerve as pivots, for another iron frame, O O, placed directly above the former. Acroſs this frame paſſes the axis of the cutter P, the ends of the axis alſo revolving upon centre ſcrews or pivots. Acroſs the engine, at a convenient diſtance, is fixed a ſtrong beam, Q, reſting upon the lower ſide rails of the wood, and ſecured by a ſtrong bolt at each end. Through the middle of this beam another centre ſcrew paſſes perpendicularly, the head being below, and the point above. Upon this is placed one end of the axis of the wheel or wheels to be cut, the axis being perpendicular, and the wheels horizontal, as repreſented at R. The apparatus by which the other end of the axis is ſecured, cannot be repreſented in the ground plan, *fig.* 18, but will be plainly ſeen in *figs.* 19 and 20.

By referring now to the profile elevation, *fig.* 19, the ſhapes and adaptation of all the parts already deſcribed will be perhaps more fully underſtood, the ſame letter always denoting the ſame part in both figures, as will appear by a very brief recapitulation.

A B C D, the wooden frame.

E, iron ſliding frame.

F, ſtandard for ſupporting the upper frame.

G, G, guides for the ſliding frame.

H, buſh for the ſcrew (partially hid, and therefore omitted in *fig.* 19.)

I, female ſcrew in the ſliding frame, (hid in *fig.* 19.)

K, fixture for the point of the ſcrew (hid in *fig.* 19.)

L, large wheel upon the axis of the ſcrew.

M, worm which works the large wheel.

N, handle of the axis of the worm (hid in *fig.* 19.)

O, upper frame placed in centres.

P, cutter and axis.

Q. Croſs beam for ſupporting the wheel to be cut.

The following parts, wholly, or partially concealed in the ground plan, *fig.* 18, will appear in the elevation, *fig.* 19.

T is a ſcrew paſſing through the front croſs bar of the upper frame; which, by coming in contact with the front croſs bar of the ſliding frame, acts as a ſtop to prevent the upper frame from being unneceſſarily depreſſed, after the cutter has paſſed through the part of the wheel, R, which it is to form. U is a ſtandard raiſed from the upper ſide rail of the wooden frame to carry a croſs-piece, V, through which a centre ſcrew paſſes to ſecure the upper end of the axis of the wheel R. W is a bearer placed upon any convenient part of the croſs-piece, V, to carry a lever, X, at the extremity of which a weight is ſuſpended, which, by overbalancing the upper-frame, raiſes it after it has been depreſſed by means of the connecting wire Y. The frame is depreſſed by preſſing down the lever Z, with the operator's foot, and this lever is connected with the frame by another wire between them. In *fig.* 19, the upright ſtandard, U, is repreſented by two lines, as if tranſparent, to ſhew the way in which the vertical axis of the wheel, R, is ſecured at the top.

Fig. 20, is a perſpective view of all that can be ſeen of the engine at the point of view where it is taken, excepting the top bearer, W, lever, X, connecting wires Y, and lever, Z, which being very plainly repreſented in *fig.* 19, are here omitted, to prevent confuſion from too many parts being crowded together upon ſo ſmall a ſcale. The point of ſight is at S, oppoſite to which, if the ſpectator will place his eye at the diſtance of $8\frac{1}{2}$ inches, he will have a correct view of the engine as it ſtands when at work. The ſame letters of reference are placed at each part of the engine which are in ſight, as in the two former figures.

If this engine is to be wrought by the application of any moving power, a faſt and looſe pulley may be placed on the axis of the cutter P, and the motion communicated from any ſhaft or drum, which moves at a proper velocity. If moved by the operator's hand, only one end of the axis is to be centered, and the other, paſſing through a buſh in the frame, is to be turned by means of a winch or handle. In conſtructing an engine of this kind, great pains muſt be taken that every part be very ſtrong and truly executed; for where the diviſions are ſo minute, the ſlighteſt vibration of any part will produce errors, which will render its operation totally uncertain. When uſing the engine, it is equally neceſſary that the cutter ſhould be always ſharp, and that too much preſſure ſhould not be applied by the foot during the operation. In ſome of the firſt trials made, a conſiderable deviation from the calculation was diſcovered after the wheels were cut. In conſequence of this, the engine was carefully re-examined, and the utmoſt pains taken that every part ſhould be both firm and correct. The experiment was then repeated, but ſtill a deviation took place, though ſometimes to a greater, and ſometimes to a leſs extent. After ſome fruitleſs attempts to correct this, the true cauſe was at length diſcovered. By the friction occaſioned by the preſſure and velocity of the motion of the cutter, both it, and the braſs rim to which it was applied, ſoon became prodigiouſly heated; and it then occurred, that the expanſion produced by the heat, both in the braſs and ſteel, muſt operate to a conſiderable degree upon diviſions ſo minute. To aſcertain how far this was the caſe, a wheel was rapidly cut, without paying any regard to the heating either of the braſs or the cutter. Both were then allowed to cool, and the cutter again applied gently to the different diviſions, the engine being ſhifted exactly as before, when thoſe diviſions which had been cut hot were found ſenſibly too deep. The wheel was then recut, or rather pared gently, for the deviations were not ſo great as ſenſibly to heat either the cutter or the rim in removing them, and upon trial the wheel ſo cut, was found exactly to produce the effect which had been expected to reſult from the calculation. Afterwards the wheels, after being cut, were always pared when cool, and the ſame error never occurred again.

The range of this engine is as follows: The ſcrew which moves the ſliding frame backwards and forwards was ſingle-threaded, and contained four threads in the inch. The large wheel, fixed upon the axis of the ſcrew, contained 144 teeth; and the worm, or ſcroll, being alſo ſingle-threaded, moved only one tooth at every revolution. It required, therefore, 144 revolutions of the ſcroll to produce one revolution of the ſcrew, and one revolution of the ſcrew moved the ſliding frame, and conſequently the cutter, $\frac{1}{4}$ of an inch; and as 144×4 is $= 576$, every revolution of the ſcroll moved the cutter only $\frac{1}{576}$th part of an inch. This was generally found ſufficient for common practice, but as it might ſometimes be neceſſary to be ſtill more minute, another ſmall wheel was fixed upon the ſame axis as the ſcroll, and divided into 10 equal parts, at each of which was formed a ſmall notch, and a ſlight ſpring, preſſing the circumference, ſerved as an index. Thus the tenth part of a revolution could be obtained, and conſequently the inch of motion of the cutter divided into 5760 equal parts. It is evident that the diviſion might be rendered more minute, almoſt *ad infinitum*; but this ſeemed to be fully as far as could be deſirable for any practical pur-

pofe, or as any machine executed by human fkill could be expected to perform with accuracy.

The engine is wrought exactly as that of the clock-maker; excepting that the operator, between every cutting, fhifts the fituation of the cutter, by turning the fcroll the number of times required.

To conftruct wheels for producing diagonal rectilinear motion by this engine, and the table already given.

If a diagonal line, of one inch in length, and forming an angle of 24° with the bafe or horizontal line be required, by one-half revolution of the two wheels; and that the fame line fhould be again defcribed in a contrary direction, by the revolution of the other half.

As every fhift is fuppofed to be $\frac{1}{32}$d part of an inch, the femi-circumference of the wheel muft be divided into 32 equal parts, or the whole into 64, and radii drawn from the circumference towards the centre. Then, to cut the horizontal wheel, (*fig.* 13. *Plate* V.) confult the table, when againft the angle 24° will be found, in the column marked Bafe at the top, 16.5. Beginning then at the divifion marked 1, cut it as near to the circumference as convenient. Proceed to 2, and turn the fcroll $16\frac{1}{2}$ turns; to advance the cutter fo as to cut the wheel deeper, repeat the fame operation upon 3, and fo on fucceffively, ftill advancing the cutter towards the centre of the wheel $16\frac{1}{2}$ turns of the fcroll at each divifion, until you arrive at 32, when the horizontal part of the line will be compleat. Cut 33 on the fame circle as 32, and then turning the fcroll the contrary way $16\frac{1}{2}$ turns at each divifion, until you arrive at 64, the wheel will be compleat, and 64 will be on the fame circle as 1.

To cut the wheel which gives the vertical motion.—Obferve, after the wheel is divided, as before, into 64 equal parts, that the divifion numbered 1 muft be at right angles to that upon the horizontal wheel, becaufe the point of motion is under the centre, (*figs.* 14 and 15. *Plate* V.) and that of the cutter on a level with it. Again confulting the table, againft 24°, in the column marked Perp. is 7.3. Cut as before the firft divifion, as near to the rim as convenient, and advance the cutter $7\frac{3}{10}$ turns at each divifion to 32. Bring it back the fame number of turns to 64, and the wheels will be ready for work. When the wheels are applied to the body to be moved, every revolution will then defcribe a ftraight line, forming an angle of 24° with the plane of the horizon, and re-defcribe the fame line returning to the point from whence it fet out. Any other angle will be produced precifely in the fame way, by ufing the numbers in the table for the turns of the fcroll. When the angle exceeds 45°, what was formerly the bafe becomes the perpendicular, and *vice verfâ*, as marked at the bottom of the refpective columns, and as in common trigonometry.

Of Curvilinear Motion.

The mere production of diagonal ftraight lines would be too limited for the ornamental varieties to which machinery of this defcription ought to be applicable. The late Mr. Hogarth has pronounced a curve to be the line of beauty, and the tafte of moft nations, the Chinefe perhaps excepted, feems ftrongly to juftify his affertion. In machinery of this defcription, the deviation of the line defcribed from one angle to another may be made fo frequent and minute, as to defcribe the circle, the ellipfe, the parabola, or any other curve, regular or irregular, with a very great degree of accuracy. In defcribing circles, or circular curves, the plan adopted was to confider them as infcribed polygons, of a number of fides proportionate to the circumference of the circle required. The infcribed polygon (*fig.* 17. *Plate* V.) although only containing 9 fides in the quadrant, or 36 in the whole circle, does not deviate very far: and had each of thefe fpaces in the circumference been again divided into 10, or even into 5 equal parts, the deviation of the polygon from the circle would have been totally imperceptible to any human eye.

To affift in calculating the circles which formed the curved lines, it was neceffary to afcertain the diameters, from which the meafure of the circumferences being found by the common geometrical analogy, the number of divifions in the wheels could be alfo found. It is evident that every fide of an infcribed polygon, with the two radii, forms an ifofceles triangle; and that therefore the acute angle at the centre of the circle being found, the other two angles, which are equal to each other, may alfo be found, by fubtracting the angle at the centre from 180°, and dividing the remainder by 2. The following rules were therefore reforted to upon this principle, and as the meafure was $\frac{1}{32}$d of an inch, that fraction was made the ftandard of unity, and all the fubfequent calculations made in thirty-fecond parts.

Rules.—1. Divide 90°, being the meafure of the quadrant of a circle, by the number of fides of a polygon infcribed in that quadrant, or by the fourth part of the fides which compleat the whole infcribed polygon. The quotient will give the meafure of the acute angle at the centre.

2. The acute angle being found by the preceding rule, is to be fubtracted from 180°, and the remainder, divided by 2, will give each of the angles at the circumference which are equal, and confequently the angle which one of them makes with the bafe or horizontal line will be found.

3. As all the triangles are fimilar, the angles of all at the circumference are equal. And as by the twenty-ninth propofition of the firft book of Euclid's Elements, alternate angles are equal to each other, the meafure of the acute angle being fucceffively fubtracted from each of the other angles, will give every angle of the polygon progreffively, or add the acute angle at the centre for the next centre angle, and fubtract it for the angle at the circumference.

Referring again to *fig.* 17. *Plate* V., the firft angle B A 1 is one of 10°. By the firft of the above rules, when 90° is divided by 9, (the number of polygonic fides in the quadrant) the quotient gives 10°. By the fecond rule $180° - 10° = 170°$, and $170° \div 2 = 85°$. The meafure of the angle A B 1 is therefore 85°. Again, the angle, B A 2, is 20°, and the angle, A 1 2, is equal to the angle A B 1, and confequently 85°; but the angles, A B 1, and A 1 *a*, being alternate angles, are equal to each other. Confequently, $85° - 10° = 75°$, the meafure of the angle *a* 1 2. In the fame way all the other angles will be found, and when found, the table already given will fhew the turns of the fcroll required to cut the bafe and perpendicular lines neceffary to produce a diagonal or hypothenufe line equal to 18, *viz.* bafe 1.5, and perpendicular 17.9. If a different meafure is wanted, it may be got by common proportion. For, if the hypothenufe is to be 15, then as 18 : 15 : : 1.5 : 1.25, for the bafe; and as 18 : 15 : : 17.9 : 14.805, for the perpendicular.

The following table gives the diameters and circumferences of a feries of circles reprefented by polygons, from a diameter of $\frac{6}{32}$d of an inch, to one of $\frac{64}{32}$d, or two inches. The firft column contains the meafure of the diameter; the fecond, that of the circumference; the third, the whole number of fides of an infcribed polygon; and the fourth, the number of fides contained in a quadrant of the circle.

TABLE II.

Diameter.	Circum.	Neareft Polygon.	Quadrant.
6	19	20	5
8	25	24	6
10	31	32	8
12	38	36	9
14	44	44	11
16	50	52	13
18	57	60	15
20	63	64	16
22	69	72	18
24	75	76	19
26	82	84	21
28	88	88	22
30	94	96	24
32	100	100	25
36	113	116	29
40	126	128	32
44	138	140	35
48	152	152	38
52	163	164	41
56	176	176	44
60	188	188	47
64	201	204	51

In the annexed table, the polygon has been in general taken above the meafure of the circumference, but the deviation is very fmall, and cannot affect any practical calculation.

The number of fides being found by this table, that which follows will give the angle which each fide forms with a horizontal ftraight line, omitting minutes and feconds, and taking the neareft degree. If greater minutenefs be required, which will be feldom, if ever, neceffary, the calculation may be carried out even to decimals of a fecond, by the rules already given. The firft column contains the fides in the whole circle, and the fecond, thofe in the quadrant, correfponding to table II. The remaining columns, numbered from 1 to 26, give the degrees in the fucceffive angles. By the firft angle is always underftood that neareft to the horizontal diameter of the circle, as A B 1, *fig.* 17. *Plate* V. up to a polygon of 100 fides, the whole angles in the quadrant are given; above that, they are only carried to the octant, or to 45°. It will, however, be obferved, that the angles omitted are the exact complements of thofe given, the extreme angles forming together 90°, and fo of the others converging towards the middle. Thus, in the laft line, where 51 angles are required to complete the quadrant, 26 only are given, and the 26th is the mean angle, or 45°. The firft angle is 89°, whofe complement being 1°, that is the meafure of the 51ft. The fecond being 87°, its complement of 3° gives the 50th, and fo of all the others.

TABLE III.

Polygon.	Quadrant.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
20	5	81°	63°	45°	27°	9°																					
24	6	83	68	53	37	22	7°																				
32	8	84	73	62	51	39	28	17°	6°																		
36	9	85	75	65	55	45	35	25	15	5°																	
44	11	86	78	70	62	54	45	36	28	20	12°	4°															
52	13	86	79	72	65	58	51	45	39	32	25	18	11°	4°													
60	15	87	81	75	69	63	57	51	45	39	33	27	21	15	9°	3°											
64	16	87	81	76	70	65	59	53	48	42	37	31	25	20	14	9	3°										
72	18	87	82	77	72	67	62	57	52	47	43	38	33	28	23	18	13	8°	3°								
76	19	88	83	78	73	69	64	59	54	49	45	41	36	31	26	21	17	12	7	2°							
84	21	88	84	80	75	71	67	62	58	54	49	45	41	36	32	28	23	19	15	10	6°	2°					
88	22	88	84	80	76	72	68	64	60	56	52	47	43	38	34	30	26	22	18	14	10	6	2°				
96	24	88	84	80	77	73	69	66	62	58	54	50	47	43	40	36	32	28	24	21	17	13	10	6°	2°		
100	25	88	84	81	77	73	70	66	62	59	55	51	48	45	42	39	35	31	28	24	20	17	13	9	6	2°	
116	29	88	85	82	79	76	73	70	67	64	61	58	55	52	49	45											
128	32	89	86	83	80	78	75	72	69	67	64	61	58	55	52	49	46										
140	35	89	86	84	81	78	75	73	70	68	65	62	60	57	54	52	49	47	45								
152	38	89	86	84	81	79	76	74	71	69	67	65	62	60	57	55	52	50	48	46							
164	41	89	87	85	83	80	78	76	74	71	69	67	65	62	60	58	56	53	51	49	47	45					
176	44	89	87	85	83	81	79	77	75	72	70	68	66	64	62	60	58	56	54	52	50	48	46				
188	47	89	87	85	83	81	79	77	76	74	72	70	68	66	64	62	60	59	57	55	53	51	49	47	45		
204	51	89	87	85	83	82	80	78	76	75	73	71	69	68	66	64	63	61	59	57	56	54	52	50	48	47°	45°

A fingle example will probably be fufficient to elucidate the ufe of all the three tables, after the previous defcriptions. Let it be required to form a circle by means of machinery, the diameter of which fhall be half an inch. As $\frac{1}{32}$ is the meafure of unity, the diameter will be reprefented by 16 in table II. By infpecting the table it will appear, that the circumference is 50, the neareft polygon 52, and the fides contained in one quadrant 13.

By table III. we find, againft the numbers quoted, for the

1ft	-	Angle	-	86°
2d	-	ditto	-	79
3d	-	Angle	-	72°
4th	-	ditto	-	65
5th	-	ditto	-	58
6th	-	ditto	-	51
7th	-	ditto	-	45
8th	-	ditto	-	39
9th	-	ditto	-	32
10th	-	ditto	-	25
11th	-	ditto	-	18
12th	-	ditto	-	11
13th	-	ditto	-	4

Let

Let us then ſuppoſe, that in deſcribing this circle, we commence our operation at the horizontal diameter, and at the right hand, as at B in *fig.* 17. *Plate* V.

Let us alſo ſuppoſe, that the frame which carries the ſtuff upon which the circle is to be deſcribed, is moveable both in a horizontal and vertical direction, as in *figs.* 13, 14, and 15. The calculation will then ſtand as follows:

1ſt Quadrant.

	Diviſion.			Baſe.	Perpendicular.	
1ſt	Angle	86°	Riſe	1.2	Sink	17.9
2d	——	79	—	3.4	—	17.7
3d	——	72	—	5.6	—	17.1
4th	——	65	—	7.6	—	16.3
5th	——	58	—	9 5	—	15.3
6th	——	51	—	11.3	—	14.0
7th	——	45	—	12.7	—	12.7
8th	——	39	—	14.0	—	11.3
9th	——	32	—	15.3	—	9.5
10th	——	25	—	16.3	—	7 6
11th	——	18	—	17.1	—	5.6
12th	——	11	—	17.7	—	3.4
13th	——	4	—	17.9	—	1.2

2d Quadrant.

	Diviſion.			Baſe.	Perpendicular.	
1ſt	Angle	4°	Riſe	17.9	Riſe	1.2
2d	——	11	—	17.7	—	3.4
3d	——	18	—	17.1	—	5.6
4th	——	25	—	16.3	—	7.6
5th	——	32	—	15.3	—	9.5
6th	——	39	—	14.0	—	11.3
7th	——	45	—	12.7	—	12.7
8th	——	51	—	11.3	—	14.0
9th	——	58	—	9.5	—	15.3
10th	——	65	—	7.6	—	16.3
11th	——	72	—	5.6	—	17.1
12th	——	79	—	3.4	—	17.7
13th	——	86	—	1.2	—	17.9

3d Quadrant.

	Diviſion.			Baſe.	Perpendicular.	
1ſt	Angle	86°	Sink	1.2	Riſe	17.9
2d	——	79	—	3.4	—	17.7
3d	——	72	—	5.6	—	17.1
4th	——	65	—	7 6	—	16.3
5th	——	58	—	9 5	—	15.3
6th	——	51	—	11.3	—	14.0
7th	——	45	—	12.7	—	12.7
8th	——	39	—	14 0	—	11.3
9th	——	32	—	15.3	—	9.5
10th	——	25	—	16.3	—	7.6
11th	——	18	—	17.1	—	5.6
12th	——	11	—	17.7	—	3 4
13th	——	4	—	17.9	—	1.2

4th Quadrant.

	Diviſion.			Baſe.	Perpendicular.	
1ſt	Angle	4°	Sink	17.9	Sink	1.2
2d	——	11	—	17.7	—	3 4
3d	——	18	—	17.1	—	5.6
4th	——	25	—	16.3	—	7.6
5th	——	32	—	15.3	—	9.5
6th	——	39	—	14.0	—	11.3
7th	——	45	—	12.7	—	12.7
8th	——	51	—	11.3	—	14.0
9th	——	58	—	9.5	—	15.3
10th	——	65	—	7.6	—	16.3
11th	Angle	72°	Sink	5.6	Sink	17.1
12th	——	79	—	3.4	—	17.7
13th	——	86	—	1.2	—	17.9

which compleats the circle.

In the above calculation, the word *riſe* is uſed when the rim of the wheel is to recede from the centre, and the word *ſink*, when it is to approach it. In the firſt quadrant of the circle, or polygon, as the point is taken from the right-hand, the frame muſt be moved by the horizontal wheel towards the right. Had the frame been ſtationary, and the tracer required to move, the motion would, of courſe, have been inverted. The riſing motion is, therefore, given to the horizontal wheel, until the frame has come into contact with the other end of the ſemidiameter, at the laſt diviſion of the ſecond quadrant.

In the ſame way, the vertical wheel muſt ſink the frame to raiſe the tracer; and this is done during the firſt quadrant, when it has arrived at what may be called the vertex. It then riſes for a whole ſemi-circle to the laſt diviſion of the third quadrant, when it again ſinks to compleat the circle. The angles of all the quadrants are the ſame, but alternately inverted. Their application to the dividing and cutting engine is taken from table I. By ſimilar means, a circle of any radius or diameter may be deſcribed, and conſequently any arc or curve of a circle. The whole of each wheel, in the inſtance given, muſt be divided into 52 equal parts, both for the horizontal and vertical motion. It will ſeldom be neceſſary to form curved lines, which are not portions of circles, where mere ornament is to be conſulted; but if it ſhould, it is evident that the ellipſe, the parabola, and the hyperbola, may be reduced to a ſeries of triangles in the ſame way as the circle, and the wheels cut accordingly, to form any of theſe geometrical figures, or any portion of either.

A few examples of the application of this kind of machinery, to produce various kinds of figures, compoſed of ſtraight, or curved lines, or of a combination of both, may ſerve further to illuſtrate the ſubject; and for theſe the reader will be pleaſed to conſult *Plate* VII.

When ſuch curves only as will produce a pleaſing effect to the eye are required, they may, almoſt always, be approximated very nearly to arcs of circles of various radii, as in the example, *fig.* 21. The three leaves of this flower conſiſt entirely of arcs of circles, the centres of which are pointed out by the letters of reference; and the angles ſubtending the arcs are repreſented by dotted lines. The middle leaf of the flower, it will appear, is formed by four circular curves, the centres of which are reſpectively at A, B, C, and D. In the ſame way, five curves, whoſe centres are at H, I, B, K, and L, form the left hand leaf; and three curves centered at G, E, and F, the right-hand leaf; the whole flower containing 12 curves.

It may now be proper to inveſtigate the conſtruction of two wheels, adapted to form this flower, the means of reducing it to the tables, and applying the cutter.

Let the tracing of the lines be commenced with the middle leaf, beginning at 5. The firſt arc will then be from 5 to 4, the centre of which is at A. By a common diagonal ſcale of 400 parts to the inch, the radius, from A to 5, meaſures about 334 of theſe parts, aud the diameter, of courſe, 668. This number, divided by 12.5, will reduce the meaſure to 32d parts, to adapt it for the engine. This will be found to be 53.44, and the fraction may be omitted, ſo that 53 will be the meaſure of the diameter of the arc. By table II., the neareſt approximation to this is 52, and the circumference of the whole circle 165. The arc meaſures 78°, namely,

namely, 25° from 5 to a horizontal line drawn through the centre A, and 53° from the ſame line to 4. Therefore, as 360° : 165 : : 78° : 35.75 being the number of polygonic ſides contained in the arc. This, by the neareſt integral number, may be taken at 36 ſides. By table III. the neareſt number for the whole circle is 164; and as the arc contains 78°, or 36 of theſe ſides, the angle at the commencement, 25° under the horizontal line will be found by the following proportion. As 78° : 36 : : 25° : 11.5384, or, in even numbers, 12. The ſides under the horizontal line are therefore nearly 12, and thoſe above will be 24, to compleat 36. For the firſt ſide therefore, take from table II. the 12th angle oppoſite to 164; then the 11th, and ſo on, until you have got to the 1ſt angle, which is the neareſt to the horizontal line. This gives the meaſure and angles of the 12 ſides below. Taking the ſame angles from 1 to 24 incluſive, and beginning at 1, will give the 24 ſides above, and theſe compleat the arc. This arc will then ſtand thus:

		Horizontal.	Perpendicular.
1ſt Angle below	65°	Riſe 7.6	Sink 16.3
2d ———	67	— 7.0	— 16.6
3d ———	69	— 6.5	— 16.8
4th ———	71	— 5.9	— 17.0
5th ———	74	— 5.0	— 17.3
6th ———	76	— 4.4	— 17.5
7th ———	78	— 3.8	— 17.6
8th ———	80	— 3.1	— 17.7
9th ———	83	— 2.2	— 17.9
10th ———	85	— 1.5	— 17.9
11th ———	87	— 0.9	— 17.9
12th ———	89	— 0.3	— 18.0

		Horizontal.	Perpendicular.
1ſt Angle above	89°	Sink 0.3	Sink 18.0
2d ———	87	— 0.9	— 17.9
3d ———	85	— 1.5	— 17.9
4th ———	83	— 2.2	— 17.9
5th ———	80	— 3.1	— 17.7
6th ———	78	— 3.8	— 17.6
7th ———	76	— 4.4	— 17.5
8th Angle above	74°	Sink 5.0	Sink 17.3
9th ———	71	— 5.9	— 17.0
10th ———	69	— 6.5	— 16.8
11th ———	67	— 7.0	— 16.6
12th ———	65	— 7.6	— 16.3
13th ———	62	— 8.4	— 15.9
14th ———	60	— 9.0	— 15.6
15th ———	58	— 9.5	— 15.3
16th ———	56	— 10.1	— 14.9
17th ———	53	— 10.8	— 14.4
18th ———	51	— 11.3	— 14.0
19th ———	49	— 11.8	— 13.6
20th ———	47	— 12.3	— 13.2
21ſt ———	45	— 12.7	— 12.7
22d ———	43	— 13.2	— 12.3
23d ———	41	— 13.6	— 11.8
24th ———	39	— 14.0	— 11.3

The firſt arc being compleated, we proceed to trace the 2d from 4 to 3, containing an angle of 76°; *viz.* 48° below and 28° above the horizontal line, drawn through the centre B. This arc being of the ſame radius as the former, the number of polygonic ſides in the whole circle will alſo be 164; and as the arc contains 76°, the ſides contained in it may be taken at 35. Of theſe, 22 will be included in the 48 degrees below the horizontal line, and 13 in the 28° above. As formerly, therefore, commence with the 22d column, and proceed ſucceſſively to the firſt, for the 22 angles below, and then, beginning again at the 1ſt, go on to the 13th for the angles above. The angles will then be 43, 45, 47, 49, 51, 53, 56, 58, 60, 62, 65, 67, 69, 71, 74, 76, 78, 80, 83, 85, 87, 89 degrees below; and 89, 87, 85, 83, 80, 78, 76, 74, 71, 69, 67, 65, 62 degrees above, which compleats the arc. The numbers for cutting may then be taken, as before, from table I. The arc, from 3 to 1, whoſe centre is at C, may next be calculated in the ſame manner, and that, from 1 to 2, whoſe centre is at D, which compleats the middle leaf.

The arcs of the whole flower, and their reſpective centres and angles, are as follow.

	Arc.	Centre.	Diameter in 32d Parts.	Circumfer. in 32d Parts.	Angles below.	Angles above.	Whole Angles.	Polyg. Sides in the Circle.	Polyg. Sides in the Arc.	Sides below.	Sides above.	Complement. Angle.	1ſt Angle.
Middle Leaf.	5 to 4	A	53	165	25°	53°	78°	164	36	12	24		65°
	4 — 3	B	53	165	48	28	76	164	35	22	13		43
	3 — 1	C	32	102	69	33	102	100	28	19	9		59
	1 — 2	D	64	203	66	51	117	204	65	36	29		27
Left-hand Leaf.	9 — 10	H	60	190	0	47	47	188	24	0	24	52°	39
	10 — 11	I	60	190	90	85	175	188	91	47	44		1
	11 — 12	B	53	165	53	68	91	164	42	25	17		53
	12 — 13	K	56	178	0	55	55	176	27	0	27	19	18
	13 — 14	L	48	152	63	0	63	152	34	34	0	6	33
Right-hand Leaf.	5 — 8	G	60	190	6	180	186	188	97	3	94	6	85
	7 — 6	E	44	140	0	109	109	140	42	0	42	36	36
	6 — 5	F	44	140	75	0	75	140	29	29	0	22	68

The

The whole number of fides contained in the 12 arcs, of which the flower confifts, will be found by adding the numbers in the 9th column, containing the polygonic fides in each arc, to amount to 550. This, therefore, is the number of equal parts into which each wheel is to be divided, previous to the cutting. If the machine will contain wheels of fufficient diameters, all this will be moft eafily effected by two wheels; but when circumftances do not admit of this, two or more wheels may be ufed for each of the motions; each of thefe wheels forming a certain portion of the figure by its revolution. In this cafe, the machinery communicating the motion from the wheels to the body which is to be acted upon, muft be fo conftructed, as to be fpeedily and eafily moved from one wheel, and placed in contact with the others fucceffively. This may be effected by a dextrous engineer in a great variety of ways, and the fuperiority of any one plan over others, muft depend fo much upon particular circumftances, arifing both from the conftruction of the machine, and from the fpecial purpofe for which it is defigned, that it would be equally difficult and fruitlefs here, to fpecify precife modes of doing this.

In the 4th, 8th, 9th, 10th, 11th, and 12th arcs laid down in the preceding calculation, no part of the arc croffes a horizontal line drawn through the centre, the whole being either above or below. As the table, No. 3, is calculated for a whole quadrant, it is, in this cafe, proper to meafure the complementary angle between the horizontal line, and the line which fubtends the arc, and to calculate the number of polygonic fides contained both in it and in the arc. The number in the complementary angle is then the diftance of the commencement of the arc from the horizontal line, and, of courfe, fhews by the table the firft angle of the arc. When an arc approaches towards the horizontal line, the fucceeding angles muft be taken from right to left, and when it recedes from it, from left to right.

When the arc does not crofs the horizontal line, the complementary angles will be found in the 12th column.

In the machinery conftructed for the purpofe of tambouring, upon thefe principles, the figures were moft frequently fmall, and the rows placed diagonally, fo as to form a kind of diamond. A fpecimen of this application of the wheels will be found in *fig.* 22. In this figure, eight flowers, exactly fimilar to each other, are reprefented; excepting only, that the two flowers in the fecond, or middle row, are inclined in a contrary direction to thofe in the firft and third rows; that is to fay, that where the one row points towards the right hand, the next points towards the left; and the fame is the cafe in every alternate row, however numerous they may be. It is unneceffary to enter much into detail about the means of effecting this, for the whole difference is comprehended in the horizontal motion, and the calculation of both flowers is exactly the fame. In cutting the wheels, it is only neceffary to reverfe the motion of the fcrew which regulates the cutter, and to fubftitute the word *rife*, for *fink*, and *vice verfâ*, according to the explanation already given. The mode of placing every row between that next to it, is effected alfo by the horizontal wheel. One row is included in the circumference of the femi-diameter of the wheel, and the circumference of the other femi-diameter is reduced as much nigher to the centre, as the diftance of one of the vertical lines in the plate is from the next line.

Another plan was fometimes ufed. The wheels were cut exactly of the fame comparative diameters, and the centering or bofoming of the alternate rows was produced, by ufing two intermediate friction-wheels between the moving-wheels and frame acted upon. This was found very correct, for the two friction-wheels which were alternately ufed, each being employed for its refpective row, were turned of different diameters. But as time was loft in engaging the one and difengaging the other at every row, the former plan was at laft preferred and adopted.

The formation, therefore, of one flower includes that of all the reft; for the formation of the remaining figures is effected merely by the difpofition of a greater number of points or tracers. In the inftance for which thefe experiments and calculations were firft made, a row of needles, or rather hooks, were placed in a frame in a horizontal pofition, and the cloth being ftretched vertically oppofite to their refpective points, was fhifted by the agency of the two wheels. Behind was another horizontal apparatus, for fupplying the threads neceffary to the operation. When it was neceffary, therefore, to fhift, it was found eafier to fhift the vertical frame containing the cloth, than the frames both before and behind. When fimilar machinery is employed to move a fingle point, or tracer, it is perhaps better to communicate the motion to the point, and to leave the furface acted on ftationary.

In the middle figure of the uppermoft line, the angles are drawn to the centres, as in *fig.* 21. They confift of four arcs, or fegments of circles, as follow:

Arc 1 to 2	Centre *b*	Diameter $\frac{20}{32}$	Arc	95°
3 to 4	- - *a*	- - $\frac{20}{32}$	-	225
5 to 6	- - *d*	- - $\frac{16}{32}$	-	56
7 to 5	- - *c*	- - $\frac{16}{32}$	-	90

The dotted lines drawn upon the figure, ferve both to afcertain the refpective diftances of the flowers, to fhew the angles fubtending the arcs, and alfo the complementary angles.

The angle *had* fubtends the arc 1 to 4, which contains 225°.

The angle 2 *b* 1, the arc 1 to 2 of 95°
The angle 5 *c* 6, the arc 5—6 of 56
The angle *a d* 5, the arc 7—5 of 90

Two fmall arcs remain to join the points of the leaves. They may be taken as femicircles, the diameters of which are each $\frac{8}{32}$. The firft upon the upper leaf commences at 45°; the fecond on the lower leaf at 0°. Each, of courfe, is 180°, or two quadrants. Every other part neceffary will be found by meafurement, or by reference to the tables, as in the former cafe, and thus any figure may be produced.

In *figs.* 23 and 24, are given fpecimens of the application of thefe wheels to produce *writing*, as in the automata, which are exhibited as matters of curiofity. The firft requires only two wheels; the fecond three wheels, for the purpofe of making the faint and bold lines. In thefe, the tracer, refembling that conducted by the human hand, may either be fuppofed to move, and the tablet to be ftationary and horizontal, as in common writing, or the table perpendicular and the pen horizontal.

It is not within the compafs of this defcription to enter into any examination of the proportions of the various letters of the alphabet, as ufed in that kind of hand-writing moft approved in Britain. This belongs more properly to the analyfis of the art of penmanfhip, than to an effay or treatife on the production of diverfified motion by the agency of machinery. In general, however, it may be proper, fhortly, to explain how the letters given as fpecimens are conftructed, and their application to the moving wheels, without at all entering into any difcuffion whether thefe are proper forms; for, from the very nature of the machinery, and the defcriptions already given, it will be evident, that any other form might be produced with equal eafe, and that Hebrew, Greek, or Arabic characters may be effected as well as thofe ufed in Britain. The conftruction of the letter O is as follows; and this alfo comprehends part of the letters *a*, *c*, *d*, *e*, *g*, and *q*. The letter O is reprefented by an ellipfe, the greater diameter of which is an inch, or in the

the integers formerly ufed, 32. The leffer diameter has been taken at 18.4. The inclination of the greater diameter paffing through the foci, has been placed at an angle of 65° with the bafe line.

Thefe being premifed, it becomes neceffary to calculate the triangles which will form a near approximation to the curvature of an ellipfe of this defcription, and of the angle of obliquity formed by the hypothenufe of each triangle with the bafe line. In order to this, nine triangles have been conftructed, forming a kind of polygon of 36 fides. The lengths, refpectively, of nine portions, both of the greater and leffer femidiameters of the ellipfe, have alfo been calculated, and from thefe, the angles of obliquity formed by each fucceffive hypothenufe with the bafe lines, have been trigonometrically afcertained, as alfo the lengths of the refpective hypothenufes, and, of confequence, of very near approximation to the circumferential curve of the ellipfe.

The manner in which thefe calculations have been done is as follows:

Let the half of the greater diameter = 16
And the half of the leffer = 9.2

As the ellipfe is conftructed by fetting off fines upon both diameters, let thefe be done at every 10°, and drawing lines through the points thus found, a feries of nine triangles will be formed in each quarter of the ellipfe, the bafes and perpendiculars of which will be refpectively as follow, (32d parts being ftill confidered as integers, and the fractions as decimals.) The greater femidiameter is here confidered as the perpendicular, and the leffer as the bafe.

Triangle.	Bafe.	Perpendicular.	Hypoth.	Acute angle with the bafe line.
1	.14375	2.80	2.804	87°
2	.4025	2.65	2.693	81
3	.69	2.55	2.64	75
4	.92	2.3	2.48	68
5	1.12125	1.95	2.3	58
6	1.3225	1.6	2.081	50
7	1.46625	1.2	1.907	39
8	1.52375	.7	1.656	25
9	1.61	.25	1.598	9
Total	9.2	16.00	20.159	

Fig. 17*. *Plate* V. is a quarter of an ellipfe of thefe proportions. The fcale is five times the fize of that calculated upon, integers being there taken as 8th parts, inftead of 32d parts. The line A B is the leffer diameter or bafe line, B C the greater diameter, and the lines from A to C the hypothenufes of the triangles which form the approximation to the elliptic curve.

From thefe refults it will appear, that the quarter of the elliptic curve meafures 20.159 in 32d parts. But as there are only nine triangles in the polygonic figure, in each quarter, it has been thought beft to allow 21 fides for the quarter, or 84 for the ellipfe. Dividing therefore the quarter into 21 parts, the following divifion of the angles will be very near the truth. Were nearer approximation, however, neceffary, the calculation might be brought ftill nigher by fetting off the femidiameters in 21 divifions by the line of fines, and calculating each upon the preceding plan.

1ft	Side Angle with bafe line	89°
2d	do. - - - -	87
3d	do. - - - -	85
4th	do. - - - -	83
5th	do. - - - -	80
6th	do. - - - -	77
7th	do. - - - -	74
8th	Side Angle with bafe line	72°
9th	do. - - - -	70
10th	do. - - - -	65
11th	do. - - - -	60
12th	do. - - - -	56
13th	do. - - - -	52
14th	do. - - - -	50
15th	do. - - - -	45
16th	do. - - - -	37
17th	do. - - - -	30
18th	do. - - - -	25
19th	do. - - - -	17
20th	do. - - - -	9
21ft	do. - - - -	4

Thus the calculation would ftand, were the ellipfe placed upright, and the leffer diameter the fame with the bafe line. But as it is affumed that the ellipfe muft be inclined until the greater diameter will form an angle of 65° with the bafe, the complement of that angle, or 25°, muft be fubtracted from each of the angles. The 18th angle will then be 0°; the 19th, 8°, under the bafe; the 20th, 16°; and the 21ft, 21°. The angles being thus found, the firft table will give the rules for cutting as ufual.

The only other example relating to penmanfhip, or the conftruction of writing automata, which it appears neceffary or proper to trouble the readers of this article with, is the letter *i*; for the curvilinear part of this feems, in combination with the *o*, to form almoft every letter of the manufcript alphabet; *a, d, m, n*, and moft others will be found very fimilar, and a practical way of conftructing the reft will afterwards be inveftigated. Of a great part of thefe letters, much is compofed of ftraight lines of different lengths; but all, by the affumption, form angles of 65° with the bafe, and of courfe all the ftraight lines, or ftraight parts of lines, muft be cut to that angle, the only difference being their refpective lengths, which may eafily be meafured. It only remains, therefore, to calculate the curvilinear parts, which are all fimilar, and therefore one calculation will anfwer for the whole. In the word *man*, which has been taken for an example, the curves at the top and bottom of the letters *m* and *n* are precifely the fame; the remaining parts of thefe letters are rectilinear. The fame is the cafe with that part of the letter *a*, which is formed by adding an *i* to the elliptical part, or *o*. The oblique lines, being equal to the larger diameter of the ellipfe, are alfo expreffed by 32. The dotted lines, which bound and interfect the writing acrofs the plate, will ferve to fhew how the centres of the circular arcs which form the curves have been taken: thefe lines are diftinguifhed by the numbers 1, 2, 3, 4, and 5. The rectilinear oblique lines are placed between the crofs lines 2 and 4. The curves confift of two arcs; the arc, *c d*, being a femicircle of a fmall diameter, the centre of which is at *f*. The dotted line, *c f d*, is the diameter, and is parallel to the leffer diameter of the ellipfe. The remaining curve, *d e*, is a fmall arc of a large circle, the centre of which is at *g*. The arc, *h i*, is taken from the centre *k*. All the other fimilar arcs are taken with equal radii from points in the parallel ftraight lines at the top and bottom of the figure. It feems unneceffary to repeat in detail the particular angles which form thefe arcs, for they will be found precifely in the fame way as the arcs formerly defcribed.

From the above it is evident, that motion in the fame plane may be diverfified to unlimited extent, by the joint application of two forces; and it has been the object of thefe defcriptions to point out means of effecting this with great precifion. The addition of a third power, acting in a line at right angles to this plane, renders the diverfity of motion

motion abfolutely unlimited, and is merely an extenfion of the former principle.

Application of Three Forces.

As already fhewn, the application of two forces, if uniform, will produce the diagonal of a fquare or parallelogram. If three are applied in the directions of the three planes of a cube, the dotted line A B in the tranfparent cube, (*fig.* 12. *Plate* V.) will be produced, provided all the moving powers act with equal velocity upon the body moved. The firft force acting in the direction of the line A B, and the fecond in that of the line B C, would produce a motion from A to C, but by the addition of the third power, moving in the direction of the perfpective line C E, at right angles to the two former, the body again diverges from the line produced by the two firft powers, and will arrive at E.

Three wheels, which produce motion in thefe different ftraight lines, muft therefore effect every poffible direction of motion, and the third wheel is to be cut precifely upon the fame principles as the former two.

As the writing and drawing automata are entirely machines conftructed upon principles fimilar to the foregoing, a fhort account of the nature of a plan by which fuch a machine may be made, may both ferve to illuftrate this, and to direct the attention of mechanics, who have hitherto confined the application of their talents to the planning and conftruction of uniform and rotatory motion, to a fubject fufceptible of endlefs variety, and which may furely be beneficially applied to many ufeful and elegant purpofes of arts and manufactures.

As this is merely an illuftration of a general principle, invented and drawn by the author of this article for the purpofe, it may, and probably will, not be found to correfpond with thofe conftructed by others; but if the general principle is afcertained to be correct, it will be of fervice in demonftrating to ingenious mechanics how fuch operations may be performed. Three motions being neceffary to produce the effect required, let the fpectator be fuppofed to be placed immediately behind the automaton which is to write or draw a certain given figure, by the agency of three wheels, fuch as thofe already defcribed. The automaton will be confidered as a mere piece of framing, fhaped in the outfide to reprefent a human figure. The moved parts are his right arm, above and below the joint at the elbow, the part from the elbow to the points of the fingers being folid, and the pen, or pencil, with which he writes, fcrewed or fitted into the hand. Before him let there be a cubical box, reprefenting the table upon which he writes, and fitted to contain the machinery by which the right arm is to be moved. The feat, body, head, and left arm, may alfo be confidered as hollow framing, within which the motion may be communicated. The tablet being placed horizontally before him upon the box or table, the motions required will be as follow: The tracing of the lines upon the tablet will be effected by the combination of two motions at right angles to each other, and thefe may be given by conftructing within that part which reprefents the fhoulder of the figure, an apparatus refembling what is called by mechanics a *univerfal joint.* The third motion at right angles to the plane of the tablet, will ferve to elevate or deprefs the point of the pen or pencil, in order to produce bold or faint lines, as may be requifite, and to lift the pencil entirely from the tablet when a blank or fpace is to be left, or when the hand of the automaton is to be fhifted from one place to another. The direction of the firft force may be fuppofed to be fuch as would produce a motion from the top to the bottom of the tablet or paper, as thefe words are generally underftood when applied to writings or books. The fecond motion ought to give a direction from left to right, which will be, of courfe, at right angles to the former, and both may be reverfed at pleafure by the fhape of the wheels. The third motion will lift the hand and pencil from the tablet, to produce the bold and faint lines, and to difengage it when neceffary.

Figs. 25 and 26. *Plate* VII. are reprefentations of fuch a figure. *Fig.* 25, is an elevation of the automaton, as feen behind, and the moving and moved parts are as follow. The framing is reprefented by the figure diftinguifhed by the letters A, A, A, A. The firft motion from the top to the bottom of the tablet is effected by the wheel, B, revolving upon the axis G. This wheel gives motion to the lever, E, refting againft the wheel upon a level with the centre, and neareft to the fpectator's eye. When the axis revolves upon its centre, the wheel, by communicating motion to the lever E, which is connected by a joint with the fmall horizontal axis fitted in the frame H, continues the motion to the lever F, reprefenting the bone of a human arm from the fhoulder to the elbow. This again gives motion to the lever, which reprefents the bones below the elbow, and confequently to the pencil by which the writing is made. Thus the firft motion, from top to bottom, is produced. The fecond motion, from left to right, is done by the wheel, C, upon the fame axis. By the revolution of the axis, this wheel acts upon the lever, I, which moves the frame, H, and the lever, F, in the direction required. The lever, I, refts upon the upper part of the circumference of the wheel, C. The third motion, for raifing or finking the pencil, is derived from the wheel, D, which, acting upon the levers connected at the joint, K, move the perpendicular lever, L, connected with the part of the right arm below the elbow. This connection will be feen more plainly in *fig.* 26, which is a profile fection of the fame machine. The lever, L, is here connected with that which paffes through the lower part of the arm, and which is marked by the letter M. The box which reprefents the table is diftinguifhed by N, and the feat by O, in both figures. The machinery thus conftructed may be concealed by any covering which gives it the appearance of a human figure, as in the outline fketch which furrounds it. The levers may be kept in contact with the wheels either by weights or fprings, as may be found moft convenient. The whole may be moved by a fpring, as in a common watch or time-piece, and the velocity of the motion regulated by a balance-wheel, pendulum, or fimilar mechanical agent. In thefe fketches all that part of the machinery which is common to other rotatory movements, is omitted; and as it is merely meant to give the reader an idea of the general principle of the whole, is confined within the compafs of the automaton. When a great number of movements is required, it is plain that many more wheels may be added, and for this there is fufficient room within the boxes which reprefent the table and the feat. The joints which are diftinguifhed by the letters, H, I, and K, are only fingle, to allow a motion from left to right, and *vice verfâ*; and the perpendicular levers pafs through a crofs bar P, with notches to ferve as guides. Thefe guides confine the levers, I and K, in every direction. That which guides the lever, E, being fo placed as to allow a motion at right angles to the others, muft be conftructed fo as not to confine the motion of the lever from the front to the back of the machine, but to prevent the lever from diverging from the wheel. This is fhewn at P, in both figures.

From the defcriptions given, it is prefumed that readers, converfant with the ftudy of the theory and practice of mechanics,

chanics, will be able to apply them to many purpofes of ingenious and ufeful practice. This article fhall therefore be concluded by a few mifcellaneous remarks.

For the many ufes to which this kind of machinery may be adapted, it will feldom be found convenient that levers, which are the moft eafy means of communicating motion in many inftances, fhould be of equal length at both fides of the fulcrum. It will, therefore, be neceffary to meafure each end, and to calculate, by common proportion, the ratio by which to adapt the divifions of the wheels to the length of each arm from the centre or fulcrum. The lever, E, (*fig.* 26.) is an inftance of this, for as its length from the joint to the extremity is more than that of the lever, F, to which it gives motion, the divifions of the wheel, D, muft be deeper than the others in the proportion by which the lever, E, exceeds the lever F.

It will alfo be apparent, that when the frame, H, moves upon its joint, the end of the lever, E, will be elevated or depreffed, and thrown off the horizontal radius of the wheel B. As the range of motion is fuppofed to be fmall, this may be fufficiently counteracted by the intervention of a friction wheel between the lever, and the wheel B, or by many other plans.

In conftructing the joints, it will alfo be neceffary to pay very minute attention, that they may be well fitted, for a very fmall deviation fo near to the centre, will produce a great aberration where the lever touches the wheel. This may be corrected by guides of that defcription, which are generally called *bridles* by mechanics. All the machinery conftructed, for the fake of curiofity and exhibition, depend entirely upon the principles already laid down. In fome inftances, it may be found more convenient to have the wheels faced like contrat wheels, and the cutting in that direction. In this cafe, the engine, already defcribed, will work with fufficient accuracy, by placing the rim of the wheel under the centre of the cutter, and adding another fcrew, wheel, and fcroll below, to ftop the cutter when at a fufficient depth. Or, if the axis of the wheels can be placed horizontally with the rim which is to be cut upon the fame level with the cutter, the effect will be the fame.

For the many purpofes to which this machinery may be adapted, it is impoffible to give precife rules. Every practical engineer, or mechanic, will know, that much muft depend upon the knowledge and experience of the director. The directions given are the refults of much practical experience, and the ingenious mechanic may apply them according to his own judgment and difcretion.

DIAGONAL *Scale*. See PLOTTING *Scale*, and SCALE.

DIAGORAS, in *Biography*, a follower of Democritus, was a native of the ifland of Melos; and having been fold as a captive in his youth, he was redeemed by Democritus, and trained up in the ftudy of philofophy. He alfo cultivated polite learning, and diftinguifhed himfelf in the art of lyric poetry. However, his entire rejection of religion incurred the reproach of fome of his contemporaries, and has tranfmitted his name to pofterity with infamy: and though Clemens Alexandrinus, and others, have endeavoured to vindicate his character by alleging that his only intention was to ridicule heathen fuperftitions, yet the general voice of antiquity has charged him with being the advocate of atheiftical principles. As he belonged to the fchool of Democritus, in which no other principles in nature befides atoms and a vacuum were admitted, it is eafy to conceive that he would reject the whole doctrine of a deity, as inconfiftent with the fyftem which he had embraced. Indeed, ancient writers exprefsly affert, that when he faw a perjured perfon efcape punifhment, he publicly avowed his difbelief of Providence, and from that time he defpifed and ridiculed the gods, and all religious ceremonies. He proceeded fo far as to lay open the facred myfteries, and to diffuade the people from fubmitting to the rites of initiation. By thefe infults which he offered to religion, he excited the hatred of the Athenians; and when he refufed to obey a fummons to appear in the courts of judicature, they iffued a decree, which was infcribed on a brazen column, propofing the reward of a talent to any one who fhould kill him, or two talents to any one who fhould bring him alive before the judges. This happened in the 91ft olympiad, B. C. 416. From that time Diagoras became a fugitive in Attica, and at laft fled to Corinth, where he died. It is faid, that being on board a fhip during a ftorm, the terrified failors began to accufe themfelves for having received into their fhip a man fo infamous for his impiety; upon which Diagoras pointed out to them other veffels, which were near them on the fea in equal danger, and afked them whether they thought that each of thefe fhips alfo carried a Diagoras; and that afterwards, when a friend, in order to convince him that the gods are not indifferent to human affairs, defired him to obferve how many confecrated tablets were hung up in the temples in grateful acknowledgment of the efcapes from the dangers of the fea, he faid, in reply, "True; but here are no tablets of thofe who have fuffered fhipwreck, and perifhed in the fea." Thefe tales, however, are fufpected to be mere inventions; for fimilar ftories have been told of Diogenes, the Cynic, and others. Brucker's Hift. of Philof. by Enfield, vol. i.

DIAGRAM, from διαγραφω, *I defcribe*, in *Geometry*, &c. a fcheme for the explanation, or demonftration, of any figure, or the properties thereto belonging.

DIAGRAM, in the *Ancient Greek Mufic*, prefented to the eye the whole extent of a fyftem; which the moderns exprefs by *Gamut*, *Scale*, *Compafs*; which fee.

DIAGRAMMA, in *Ichthyology*, a fpecies of *Perca*, which fee.

DIAGRYDIUM, in *Pharmacy*, is fcammony prepared for medicinal ufe. Scammony is a very powerful draftic purgative, which is feldom given by itfelf, but always divided by triture with fugar, gum arabic, or other mild fubftances, or with the gentler purgatives. The preparations which went under the term diagrydium in the older Pharmacopœias, but are now difufed, confifted of fcammony, not merely mixed by triture with other fubftances, but prepared with more pains.

The *Diagrydium Sulphuratum* confifts of fcammony in fine powder fpread thinly on a paper full of pin holes, and held over the vapour of burning fulphur, with frequent ftirring, to prevent the fcammony from fcorching or clotting together. It was fuppofed to be dulcified, and its operation on the human body to be rendered milder and fafer by this expofure to the fulphureous acid vapour. This preparation is now totally difufed.

The *Diagrydium cum Liqueritia* is thus prepared, according to the Pharmacopœia Helvetica: Boil two ounces of liquorice-root with three pints of water, till about half a pint is confumed: then rub in a mortar fix ounces of fcammony in fine powder, with this liquorice decoction, and pour off the milky liquor from the blackifh fediment which remains. Evaporate this liquor with a heat not exceeding that of boiling water, firft to the confiftence of an extract, then dry it further, till it becomes hard and pulverulent.

By this preparation the fcammony lofes much of its naufeous tafte, and its acrimony, but retains a very powerful purgative quality, when in the dofe of from five to twenty grains,

grains, and the liquorice gives it an agreeable taſte, which children do not refuſe.

This preparation, or a ſimilar one, in which the watery emulſion of ſcammony is employed, might, as we believe, be often employed with advantage, in preference to the compound powders, in which the ſcammony is ſimply rubbed with other ingredients. It is, however, entirely diſuſed in this country.

DIAH, or DIAT, a name given by the Arabs to the puniſhment of retaliation. By the Mahometan law, a brother, or the next relation of a murdered perſon, ought to take part againſt the murderer, and demand his blood in reparation for that which he has ſhed. Before the time of Mahomet, the Arabs had a cuſtom of putting a freeman of their priſoners to death, in lieu of every ſlave they loſt in battle, and a man for every woman that was killed. But Mahomet regulated the laws of repriſal; directing in the Alcoran, by the diat, that a freeman ſhould be required for a freeman, and a ſlave for a ſlave. The Turks, probably in conſequence of this law, formerly maſſacred almoſt all their priſoners of war, but they now content themſelves with enſlaving and ſelling them.

DIAHEXAPLA, from δια and ἑξαπλοος *ſix fold*, among *Farriers*, a drink made for horſes, denominated from the ſix ingredients it conſiſts of, *viz.* birth-wort, gentian root, juniper-berries, bay-berries, myrrh, and ivory-ſhavings. It is eſteemed a good ſtomachic, and cures bites of venomous beaſts, colds, conſumptions, &c.

DIAION, in the *Ancient Writers of Medicine*, the name of a compoſition made into the form of troches, of which violet-flowers were one of the principal ingredients. The compoſition is deſcribed at large by Myrepſus.

DIAL, or SUN DIAL, an inſtrument ſerving to meaſure time by means of the ſhadow of the ſun.

The word is formed from *dies*, day, becauſe indicating the hour of the day. See HOUR.

The ancients alſo call it ſciathericum, from its doing it by the ſhadow.

DIAL is more accurately defined a draught, or deſcription, of certain lines on a plane, or ſurface of a body given, ſo contrived as that the ſhadow of a ſtyle, or ray of the ſun paſſed through a hole therein, ſhall touch certain points at certain hours.

The antiquity of dials is beyond doubt. Some attribute their invention to Anaximander, or his diſciple Anaximenes Mileſius, who flouriſhed in the ſixth century, B. C.: and others to Thales. Vitruvius mentions one made by the ancient Chaldee hiſtorian Beroſus, on a reclining plane, almoſt parallel to the equinoctial. Ariſtarchus Samius invented the hemiſpherical dial. And there were at the ſame time ſome ſpherical ones, with a needle for a gnomon. The diſcus of Ariſtarchus was an horizontal dial, with its limb raiſed up all around to prevent the ſhadow ſtretching too far.

But it was late before the Romans became acquainted with dials. The firſt ſun-dial at Rome was ſet up by Papirius Curſor, the Roman general, about the year of the city 461, B. C. 293; before which time, ſays Pliny, there is no mention of any account of time but by the ſun's riſing and ſetting: this firſt dial was ſet up at or near the temple of Quirinus, but it was imperfect; about thirty years after, as Pliny informs us, on the authority of Varro, M. Valerius Meſſala being conſul, brought from Catania in Sicily another dial, which he ſet up on a pillar near the roſtrum; but for want of its being made for that latitude, it could not point out the hours with exactneſs. They, however, made uſe of it ninety-nine years; till the cenſor Marcius Philippus ſet up another more accurate, and conſtructed for the latitude of Rome, near that of Valerius. In that interval dials became common at Rome, as appears from a fragment of Plautus, preſerved by Aulus Gellius. It is an hungry paraſite that ſpeaks.

"Ut illum dii perdant, qui primus *horas* reperit,
Quique adeo primus hic ſtatuit ſolarium,
Qui mihi comminuit miſero articulatim *diem!*
Nam me puero uterus hic erat ſolarium,
Multò omnium iſtorum optumum et veriſſimum,
Ubi iſte monebat eſſe, niſi cum nihil erat.
Nunc etiam quod eſt, non eſt, niſi ſoli lubet.
Itaque adeo jam oppletum eſt oppidum ſolariis,
Major pars populi aridi reptant fame."

However, as a ſun-dial did not ſerve in cloudy weather, Scipio Naſica, five years after, remedied this defect, by introducing a method of dividing the night as well as the day into hours, by means of a water-machine, or *clepſydra* (which ſee); called by Pliny an *horologium.*

But there ſeem to have been dials among the Jews much earlier than any of theſe. Witneſs the dial of Ahaz, who began to reign four hundred years before Alexander, and within twelve years of the building of Rome, 741 years B. C.: mentioned by Iſaiah, chap. xxxviii. ver. 8.

The ancient Bramins ſeem to have been acquainted with this inſtrument, and to have applied it to aſtronomical purpoſes. The Chineſe and Egyptians were alſo acquainted with it at a very early period. Learned men have generally aſcribed the invention of it to the Babylonians, from whom the Jews derived it before the time of Ahaz. Herodotus traces the knowledge of the art of dialling among the Greeks to the ſame ſource.

The diverſity of ſun-dials ariſes from the different ſituation of the planes, and the different figure of the ſurfaces whereon they are deſcribed; whence they become denominated equinoctial, horizontal, vertical, polar, direct, erect, declining, inclining, reclining, cylindrical, &c. For the general principles of their conſtruction, ſee DIALLING. See alſo *Gnomonic* PROJECTION.

Dials are ſometimes diſtinguiſhed into primary and ſecondary.

DIALS, *primary*, are thoſe either drawn on the plane of the horizon, called horizontal dials; or, perpendicular thereto, on the planes either of the meridian, or prime vertical, called vertical dials: to which number are alſo uſually added, thoſe drawn on the polar and equinoctial planes, though neither horizontal, nor vertical.

DIAL, *equinoctial*, is that deſcribed on an equinoctial plane, or a plane repreſenting that of the equinoctial.

A plane oblique to the horizon, either hangs over towards it, and makes an acute angle with the plane of the horizon, or it falls off backwards from it, and makes an obtuſe angle therewith. This latter is called a reclining plane; which, if it recline back at an angle equal to the complement of the latitude of the place, then it lies in the plane of the equinoctial; and a dial drawn thereon, is denominated an equinoctial dial.

Equinoctial dials are uſually diſtinguiſhed into upper, which look towards the zenith; and lower, which reſpect the nadir.

Now, as the ſun only illumines the upper ſurface of an equinoctial plane, while he is in our hemiſphere, or on the northern ſide of the equator, an upper equinoctial dial will only ſhew the hour, during the ſpring and ſummer ſeaſon.

And again, as the ſun only illumines the lower ſurface of an equinoctial plane, while he is in the ſouthern hemiſphere, or

or on the other side of the equator; a lower equinoctial dial will only shew the hour in autumn and winter.

To have an equinoctial dial, therefore, that shall serve all the year round, the upper and lower must be joined together; that is, it must be drawn on each side of the plane.

And, since the sun shines on one side or on the other of an equinoctial plane the whole day, such a dial will shew all the hours of an artificial day.

To describe an equinoctial Dial *geometrically.*—The equinoctial is the first, easiest, and most natural, of all dials; but the necessity of drawing it double, prevents its being much in use. However, as its structure shews the reason of the other kinds, and as it even furnishes a good mechanical method of drawing all the other kinds of dials, it shall be here laid down.

First, then, to describe an upper equinoctial dial: from a centre C (*Plate* I. *Dialling fig.* 4.) describe a circle A B D E, and by two diameters A D, and B E, intersecting each other at right angles, divide it into quadrants A B, B D, D E, and E A. Subdivide each quadrant into six equal parts, by the right-lines C I, C II, C III, &c. which lines will be hour lines. Through the centre C drive a style, or pin, perpendicular to the plane A B D E.

The dial thus described being raised so as to be in the plane of the equator, the line C XII, in the plane of the meridian, and the point A looking towards the south, the shadow of the style will shew the hours both of the forenoon and afternoon.

For horary circles include arcs of the equator of fifteen degrees each; consequently, the plane A B D E being supposed in the plane of the equator, the horary circles will likewise include arcs of 15 degrees of the circle A B D E. Wherefore, since the angles XII C XI, XI C X, X C IX, &c. are each here supposed 15 degrees, the lines C XII, C XI, C X, C IX, &c. are intersections of horary circles with the plane of the equinoctial.

Again, since the style passing through the centre C represents the axis of the world; its distance from the centre of the earth being inconsiderable, and it being the common diameter of the horary circles, its shadow will cover the hour-line C XII, when the sun is in the meridian, or circle of 12 o'clock; C XI, when in the circle of 11 o'clock; C X, when in the circle of 10 o'clock, &c.

Secondly, to describe a lower equinoctial dial: the method is the same as that for the upper dial, already described; except that no hour-lines are to be drawn beyond that of six o'clock.

Thirdly, to describe an universal equinoctial dial: join two metal, or ivory planes, A B C D, and C D E F, (*fig.* 5.) so as to be moveable at the joint. On the upper surface of the plane A B C D, describe an upper equinoctial dial, and upon the lower a lower, as already directed; and through the centre I drive a style. In the plane D E F C cut a box, and put a magnetic needle G therein; fit on the same plane a brass quadrant nicely graduated, and passing through a hole cut in the plane A B C D. Now, since this may be so placed, by means of the needle, as that the line I 12 shall be in the plane of the meridian; and, by means of the quadrant, may be so raised, as that the angle B C F shall be equal to the elevation of the equator; it will serve as a dial in any part of the world. When the sun is in the equator, these dials can be of no use.

The best universal dial is that of Mr. Pardie, of which the following description is given by Mr. Ferguson. This dial consists of three principal parts; the first is called the horizontal plane A (*fig.* 6.) because in practice it must be parallel to the horizon; in this plane is fixed an upright pin, which enters into the edge of the second part B D, called the meridional plane, which is made of two pieces, the lowest whereof, B, is called the quadrant, because it contains a quarter of a circle divided into 90 degrees; in which part, near B, the pin enters. The other piece is a semicircle D, adjusted to the quadrant, and turning in it by a groove, for raising or depressing the diameter E F of the semicircle, which diameter is called the axis of the instrument. The third piece is a circle G, divided on both sides into 24 equal parts, which are the hours. This circle is put on the meridional plane, so that the axis E F may be perpendicular to the circle; and the point C be the common centre of the circle, semi-circle, and quadrant. The straight edge of the semicircle is chamfered on both sides to a sharp edge, which passes through the centre of the circle. On one side of the chamfered part, the first six months of the year are laid down, according to the sun's declination for their respective days, and on the other side the last six months. And against the days on which the sun enters the signs, there are straight lines drawn upon the semicircle, with the characters of the signs marked upon them. There is a black line drawn along the middle of the upright edge of the quadrant, over which hangs a thread H, with its plummet I, for levelling the instrument. From the 23d of September to the 20th of March, the upper surface of the circle must touch both the centre C of the semicircle, and the line of ♈ and ♎; and from the 20th of March to the 23d of September, the lower surface of the circle must touch that centre and line. In order to find the time of the day by this dial, it must be set on a level place in sun-shine, and adjusted by the levelling screws *k* and *l*, till the plumb-line hangs over the black line upon the edge of the quadrant, and parallel to the said edge; then move the semicircle in the quadrant, till the line of ♈ and ♎ (where the circle touches) comes to the latitude of the place in the quadrant; and turn the whole meridional plane B D, with its circle G, upon the horizontal plane A, till the edge of the shadow of the circle falls precisely on the day of the month in the semicircle; and then the meridional plane will be due north and south, the axis E F will be parallel to the axis of the world, and will cast a shadow upon the true time of the day, among the hours in the circle, which is now in the plane of the equinoctial. The upper surface of the circle will serve from the 20th of March to the 23d of September; and the lower for the rest of the year.

The months and signs are laid down on the semicircle in the following method. Draw the right line A C B (*fig.* 7.) equal to the diameter of the semicircle A D B, and cross it in the middle at right angles with a line E C D, equal in length to A D B; then E C will be the radius of the circle F C G, which is the same as that of the semicircle. Upon E, as a centre, describe the circle F C G, on which set off the arcs C *h* and C *i*, each equal to $23\frac{1}{2}$ degrees, and graduate them accordingly, for the sun's declination. Then, laying the edge of a ruler over the centre E, and also over the sun's declination for every fifth day of each month, as found in tables of declination, mark the points on the diameter A B of the semicircle from *a* to *g*, which are cut by the ruler; and here place the days of the months, answering to the sun's declination. Set one foot of the compasses in C, and extending the other to *a* or *g*, describe the semicircle *a b c d e f g*; divide this into six equal parts, and through the points of division draw right lines parallel to C D, for the beginning of the signs (of which one-half are on one side of the semicircle, and the other half

on the other) and set the characters of the signs to their proper lines. Fergufon's Lectures, &c. Lect. 10.

DIAL, *Horizontal*, is that defcribed on a horizontal plane, or a plane parallel to the horizon.

Since the fun may illuminate an horizontal plane at all times of the year, while he is above the horizon; an horizontal dial may fhew all the hours of the artificial day throughout the year: fo that a more perfect dial than this kind cannot be required.

To defcribe an horizontal DIAL *geometrically*.—Draw a meridian line A B (*fig.* 8.) on the given immoveable plane; or affume it at pleafure, on a moveable one. See MERIDIAN *line*.

From a point taken at pleafure, as C, erect a perpendicular C D, and make the angle C A D equal to the elevation of the pole. In D make another angle C D E, equal likewife to the elevation of the pole, and draw the right line D E, meeting A B in E. Then make E B equal to E D, and from the centre B, with the radius E B, defcribe a quadrant, E B F, which divide into fix equal parts. Through E draw the right line G H, cutting A B at right angles. From the centre B, through the feveral fubdivifions of the quadrant E F, draw right lines B *a*, B *b*, B *c*, B *d*, B H, meeting the line G H, in the points *a*, *b*, *c*, *d*, H. From E, upon the right line E G, fet off the intervals E *a*, E *b*, &c. *viz*. E *a*, from E to *e*, E *b*, from E to *f*, E *c* from E to *g*, &c. from the centre A defcribe a little circle, and applying a little ruler to A, and the little points of divifion *a*, *b*, *c*, *d*, H, and *e*, *f*, *g*, *h*, G, draw the lines A XI, A X, A IX, A VIII, A VII, and A I, A II, A III, A IV, A V. Through A draw a right line VI, VI, perpendicular to A B. Continue the right line A VII, beyond the little circle to VII, A VIII to VIII, A V to V, and A IV to IV. Round the whole fcheme draw a fquare, circle, or oval figure. And laftly, in A fix an index, making an angle D A C, with the meridian A B, equal to the elevation of the pole; or in C erect a perpendicular ftyle equal to C D; or at A E fix a triangular plate A D E perpendicular to the plane of the dial. In this cafe, the lines, A XI, A X, A IX, &c. are the hour-lines of the forenoon; and A I, A II, A III, &c. thofe of the afternoon; and the fhadows of any of the gnomons, or ftyles above-mentioned, at the feveral hours, will fall on the refpective hour-lines.

To defcribe an horizontal DIAL *trigonometrically*.—In large dials, where the utmoft accuracy is required, geometrical lines are beft fet afide; and in lieu thereof, the lines of the dial are to be determined by trigonometrical calculation. M. Clapies, in the Memoires de l'Academie Royal des Sciences, anno 1707, has done the world good fervice in this refpect; having rendered the calculation of the hour-lines, which before had been operofe enough, exceedingly eafy and expeditious: his canons, or analogies, we fhall lay down under the refpective kinds of dials. And, firft, for an horizontal dial; the elevation of the pole of the place being given to find the angles which the hour-lines make with the meridian in the centre of the dial.

The analogy, or canon, is this: as the whole fine or radius is to the fine of the elevation of the pole of the place, fo is the tangent of the fun's diftance from the meridian, for the hour required, to the tangent of the angle required: that is, as the fide A C (*fig.* 9.) is to D C, fo is the tangent of F D C to the tangent F C, of the angle F A C. See TANGENT, &c.

To defcribe an horizontal DIAL *by the terreftrial globe*.—Let a common globe of twelve inches diameter, upon which are ufually drawn twenty-four meridian femi-circles, be elevated to the latitude of any given place, and turned about until any one of thefe meridians cuts the horizon in the north point, where the hour of XII is fuppofed to be marked; the reft of the meridians will cut the horizon at the refpective diftances of all the other hours from XII. Let thefe points of diftance be marked on the horizon, the globe be removed, and a flat board or plate, even with the furface of the horizon, put into its place, then ftraight lines drawn from the centre of the board to thefe points will be the hour-lines of an horizontal dial for that latitude; and the gnomon will be in the fituation of the axis of the globe, or make an angle with the plane of the dial equal to the latitude of the place. If the globe be elevated to the complement of the latitude of the given place, and you proceed as above, you will have a direct fouth dial: obferving, that the gnomon makes an angle with the dial plane equal to the co-latitude of the place, and that the hours on the dial muft be fet the contrary way to that on the horizontal. If the globe has more than twenty-four meridian femi-circles, the procefs is fomewhat different. Elevate the pole to the latitude $51°\frac{1}{2}$ N. *e. gr.* of London, and bring the firft meridian, or that of London on the Englifh globe, to the north: fet the hour-index to the uppermoft XII on the horary circle; then turn the globe weftward, till the index points fucceffively to I, II, III, IV, V, and VI in the afternoon; or until 15, 30, 45, 60, 75, and 90 degrees of the equator pafs under the brazen meridian; and the firft meridian will mark the following degrees on the horizon from the north towards the eaft, *viz*. $11\frac{2}{3}$, $24\frac{1}{4}$, $38\frac{1}{12}$, $53\frac{1}{2}$, $71\frac{1}{15}$, and 90; which are the refpective diftances of the above hours from XII on the plane of the horizon.

In order to transfer thefe and the reft of the hours to an horizontal plane, draw the parallel right lines *a c* and *b d* (*fig* 10.) upon that plane, at a diftance equal to the thicknefs of the gnomon; and the fpace between them will be the meridian or twelve o'clock line of the dial. At right angles to this meridian, draw *g h*, and on *a* and *b* as centres, with the fame radius of any length, defcribe the quadrants *g e*, and *f h*, and graduate them. The centre of the plane C, and the centres of thefe quadrants *a* and *b*, are at a little diftance from each other, in order to enlarge the hour diftances about noon. Lay a ruler on the centre *b*, and on the feveral diftances already found, *viz*. $11\frac{2}{3}$, $24\frac{1}{4}$, &c. in the quadrant *f h*, and draw the refpective afternoon hour-lines to I, II, &c. As the fun rifes about four in the morning, on the longeft days in London, continue the hour-lines of III and V in the afternoon through the centre *b* to the oppofite fide of the dial. Then lay the ruler on the centre *a*, through the fame diftances, refpectively in the quadrant *e g*, draw the forenoon hour-lines of XI, X, &c. and as the fun does not fet before eight in the evening on the longeft days, continue the hour-lines of VII and VIII through the centre *a*, to the other fide. Through $51\frac{1}{2}$ degrees of either quadrant from its centre draw the right line *a g*, which will be the hypothenufe or axis of the gnomon *a g i*; and from *g* let fall a perpendicular to the meridian *a i*; and a plate fimilar to the triangle *a g i*, fet up between *a c* and *b d*, will have its hypothenufe *a g* parallel to the axis of the world, when the dial is truly fet, and will caft a fhadow on the hour of the day. A line of cords will fuperfede the neceffity of graduating the quadrants. An erect fouth dial (*Plate* II. *fig.* 15.) is conftructed in the fame manner, obferving the rule already given with refpect to the elevation of the pole, and of the gnomon, and the pofition of the hours. Fergufon's Lect. lect. 10.

To defcribe an horizontal DIAL *mechanically, by the dialling fcales*.—Draw a double meridian line *a b*, *c d*, (*fig.* 11.) on the horizontal plane, and crofs it at right angles by the fix o'clock

o'clock line fe; take the latitude of the place with the compaffes, in the fcale of latitudes, and fet that extent from c to e, and from a to f, on the fix o'clock line; then taking the whole fix hours between the points of the compaffes in the fcale of hours; with that extent fet one foot in the point e, and let the other foot fall where it will upon the meridian line $c\,d$, and at d. Do the fame from f to b, and draw the right lines $e\,d$ and $f\,b$, each of which will be equal in length to the whole fcale of hours. When this is done, fet one foot of the compaffes in the beginning of the fcale at XII, and extending the other to each hour on the fcale, lay off thefe extents from d to e for the afternoon hours, and from b to f for thofe of the forenoon; and thus the lines $d\,e$ and $b\,f$ will be divided in the fame manner as the hour fcale is divided, at 1, 2, 3, 4, 5, and 6; on which the quarters may alfo be laid down, if required. Then, laying a ruler on the point c, draw the firft five hours in the afternoon from that point through the dots at the numeral figures 1, 2, 3, 4, 5, on the line $d\,e$, and continue the lines of IIII and V through the centre c to the other fide of the dial for the like hours of the morning; then lay the ruler on the point a, and draw the laft five hours in the forenoon through the dots 5, 4, 3, 2, 1, on the line $f\,b$; and continue the hour-lines of VII and VIII through the centre a, to the other fide, for the like hours of the evening; fet the hours to the refpective lines, and make the gnomon in the manner already directed for the horizontal dial.

An erect fouth dial may be made by taking the co-latitude of the place from the fcale of latitudes, and proceeding in all refpects for the hour-lines, as in the horizontal dial; only reverfing the hours, as in *fig.* 15. and making the angle of the ftyle's height equal to the co-latitude.

An horizontal dial may be eafily defcribed with only a line of cords, or a graduated quadrant of a circle. With any opening of the compaffes, as Z L, (*fig.* 12.) defcribe the two femicircles L F k and L Q k, on the centres Z and z, where the fix o'clock hour line croffes the double meridian line, and divide each femicircle into twelve equal parts, beginning at L; then connect the divifions, which are equidiftant from L, by the parallel lines K M, I N, H O, G P, and F Q. Draw V Z for the hypothenufe of the ftyle, making the angle V Z E equal to the latitude of the place; and continue the line V Z to R. Draw the line R r parallel to the fix o'clock line, and fet off the diftance a K from Z to Y, the diftance b I from Z to X, c H from Z to W, d G from z to T, and e F from Z to S. Then draw the lines S s, T t, W w, X x, and Y y each parallel to R r. Set off the diftance y Y from a to 11, and from f to 1; the diftance x X, from h to 10, and from g to 2; w W from c to 9, and from h to 3; t T from d to 8, and from i to 4; s S from e to 7, and from n to 5. Then laying a ruler to the centre z, draw the forenoon hour-lines through the points 11, 10, 9, 8, 7: and laying it to the centre z, draw the afternoon lines through the points 1, 2, 3, 4, 5; continuing the forenoon lines of VII and VIII through Z, to the oppofite fide of the dial, for the like afternoon hours; and the afternoon lines IIII and V through z for the like morning hours. Set the hours to the lines, and erect the ftyle, and the dial is complete. A fouth dial may be conftructed in the fame manner, by drawing the line V Z to make an angle with the meridian Z L equal to the co-latitude of the place, &c. reverfing the hours, as in *fig.* 15. Fergufon ubi fupra.

Dial, *Vertical*, is that drawn on the plane of a vertical circle. See Vertical.

Of thefe there are feveral varieties according to the vertical pitched upon. The verticals chiefly ufed, are the prime vertical, and the meridian; from which refpectively arife, fouth, north, eaft and weft dials.

Dials which refpect the cardinal points of the horizon, are particularly called direct dials. See Direct.

If any other vertical be chofen, the dial is faid to decline. Farther, if the circle, whofe plane is ufed, be perpendicular to the horizon, as is fuppofed to be the cafe in all thofe now mentioned, the dials are particularly denominated erect. *E. gr.* erect fouth, erect north, &c.

Otherwife the plane, being oblique to the horizon, they are faid either to incline or recline.

Dial, *South*, or, more particularly an *erect direct fouth* Dial, is that defcribed on the furface of the prime vertical circle looking towards the fouth.

Since the fun then illumines the plane of the prime vertical looking to the fouth, when, in its progrefs, he paffes from the prime vertical to the meridian, or returns back, from this to that; in which he is employed fix hours before, and fix after noon; a fouth dial fhews the hours from fix in the morning to fix at night

Dial, *To draw a vertical fouth.* — On the plane of the prime vertical looking fouthwards, draw a meridian line A B (*fig.* 13.) and taking the interval A C, at pleafure, for the magnitude of the future dial, in C erect a perpendicular, of an indefinite length C D, and making an angle C A D equal to the elevation of the equator; draw a right line A D, meeting the perpendicular C D in D. Then in the point D make the angle C D E likewife equal to the elevation of the equator, and draw the right line D E cutting the meridian in E. Through E draw the right line G H, cutting the meridian A B at right angles. Take E B equal to E D, and with this radius defcribe a quadrant E F. The reft is performed as in an horizontal dial, except that the hours of the afternoon are to be written on the right hand, and thofe of the forenoon on the left; as may be conceived from the figure. Laftly, in the point A fix an oblique ftyle, in an angle equal to the elevation of the equator; or in C erect a perpendicular ftyle, equal to C D; or, laftly, a triangular plate A D E, upon A E, fo as to be perpendicular to the plane of the dial.

Then will the fhadow of any of thefe indexes touch the feveral hour-lines, at their refpective hours.

Dial, *North*, or *erect direct north* Dial, is that defcribed on the furface of the prime vertical looking northward.

Since the fun only illumines this furface while he advances from the eaft to the prime vertical, and proceeds from the fame vertical to the weft; and fince he is in the prime vertical at fix o'clock in the morning, and at fix in the evening; a north dial fhews the hours before fix in the morning, and thofe after fix in the evening. And hence, as in autumn and winter-time, the fun does not rife before fix, and fets before fix in the evening, a north dial is of no ufe all that time; but this being joined with a fouth dial, fupplies the defects thereof.

Dial, *To defcribe a vertical north.* Draw a meridian line E B, (*Plate* II. *fig.* 14.) and from A defcribe a little circle at pleafure. At A make the angle D A C equal to the elevation of the equator, and from the point C, taken at pleafure, erect a perpendicular C D, meeting A D in D. Make another angle, C D E, likewife equal to the elevation of the equator, and draw likewife a line D E, meeting A E in E; then take I B equal to E D, and through I draw G H; cutting A B at right angles; and from the centre B, with the radius I B, defcribe a quadrant, which divide into fix equal parts: through the two extreme divifions draw lines from the centre B, *viz.* B h, and B G, meeting G H in h and G, and make I d equal to I b, and I H equal

to

to I G; then applying a ruler to A and *h*, and G, and again to A and *d*, and H, draw the right lines A V, A IV, A VII, and A VIII. Laftly, in A fix an oblique index A D, making an angle D A E, with a meridian line in the plane of the meridian, equal to the elevation of the equator; or the perpendicular index in C, equal to C D; or, inftead of an index, a triangular plate E D A, on the meridian line E A, perpendicular to the plane of the dial.

Then will A IV, A V, A VI, be the hours of the forenoon; and A VI, A VII, and A VIII, thofe of the afternoon; and accordingly will be pointed out by the fhadow of the feveral indexes. Or thus, in a fouth dial (*fig.* 13.) if the hour lines IV and V, as alfo VII and VIII, be continued beyond the line VI A VI; and the triangle A D E turned about its pole A, till A E fall directly on A XII produced; it is evident, a north dial is hereby had, only obferving what has been faid about writing the hours.

To draw a vertical north or *fouth* Dial *trigonometrically*.

Thefe only differ from the horizontal dial, in that the angle C A B is equal to the complement of the elevation of the pole of the place; fo that the fame analogy ferves as for the horizontal one; only making the fecond term the complement of the elevation of the pole of the place.

For the method of defcribing this dial by a globe, and by *dialling fcales*, fee *Horizontal* Dial.

Dial, *Eaft*, or *erect direct eaft* Dial, is that drawn on the plane of the meridian, looking to the eaft.

Since the fun only illumines the plane of the meridian looking eaftward, before noon, an eaft dial can only fhew the hours till twelve o'clock.

Dial, *To defcribe an eaft*. On the eaftern fide of the plane of the meridian draw a right line A B (*Plate* II. *fig.* 16.) parallel to the horizon, and to this join A K, making with it an angle K A B, equal to the elevation of the equator: then, with the radius D E, defcribe a circle, and through the centre D draw E C perpendicular to A K, by which means the circle will be divided into four quadrants. Each of thefe quadrants fubdivide into fix equal parts. And from the centre D through the feveral divifions draw the right lines D IV, D V, D VI, D VII, D VIII, D IX, D X, D XI. Laftly, in D erect a ftyle equal to the radius D E, perpendicular to the plane; or, on two little pieces perpendicularly fixed in E C, and equal to the fame radius D E, fit an iron rod, parallel to E C.

Thus will each index at the feveral hours project a fhadow to the refpective hour-lines IV IV, V V, VI VI, &c.

Dial, *Weft*, or *erect direct weft* Dial, is that defcribed on the weftern fide of the meridian.

As the fun only illumines that fide of the plane of the meridian looking to the weft after noon, a weft dial can only fhew the hours from noon to night.

This, therefore, joined with an eaft dial, fhews all hours of the day.

Dial, *To draw a weft*. The conftruction is perfectly the fame as that of an eaft dial, only that its fituation is inverted, and the hours are written accordingly.

Dial, *Polar*, is that defcribed on a plane paffing through the poles of the world, and the eaft and weft points of the horizon. It is of two kinds, the firft looking up towards the zenith, and called upper; the latter down to the nadir, called lower.

The polar dial, therefore, is inclined to the horizon in an angle equal to the elevation of the pole.

Since the polar plane P O Q S (*fig.* 17.) paffes through the eaft and weft points O and S, a quadrant of the equator is intercepted between it and the meridian; confequently the upper furface is illumined by the fun from fix in the morning to fix at night; and the lower from the fun's rife to fix in the morning, and from fix in the evening to fun-fet. A lower polar dial, therefore, fhews the hour of the morning from fun-rife to fix o'clock, and that of the evening, from fix to fun-fet; and an upper, the hours from fix in the morning to fix in the evening.

Dial, *To draw an upper polar*. Draw a right line A B (*fig.* 18.) parallel to the horizon; and if the plane be immoveable, find the meridian line C E. Divide C E into two equal parts, and through C draw a right line F G parallel to A B. Then from the centre D, with the interval D E, defcribe a quadrant, which divide into fix equal parts; and from the fame centre D, through the feveral points of divifion, draw right lines, D I, D II, D III, D IV, D V, and the intervals E I, E II, E III, E IV, E V, fet off the contrary way, *viz.* E XI, X, IX, VIII, and VII. From the points V, IV, III, II, I, &c. raife perpendiculars meeting the line F G in the correfpondent points. Laftly, in D erect a perpendicular ftyle equal to D E, or on two equal pieces, E and C, fix a crofs iron rod.

Then will XII XII, I I, II II, III III, &c. be hour-lines, to be pointed out at the proper times by the fhadow of the indices.

Dial, *an upper polar*, only differs in fituation, and the manner of writing the hours, from eaft and weft dials, joined together in the line of fix o'clock.

Dial, *a lower polar*, is had by putting out the hours of the forenoon, IX, X, and XI, and thofe of the afternoon, I, II, and III, with the noon-hour XII, itfelf; and only leaving the hours VII and VIII of the morning, and IV and V in the evening.

To make three Dials *on three different planes, fo that they may all fhew the time of the day by one gnomon.*—On the flat board A B C (*fig.* 19.) defcribe an horizontal dial, with its gnomon, F G H, the edge of the fhadow of which fhews the time of the day. To this horizontal board join the upright board E D C, touching the edge G H of the gnomon: then making the top of the gnomon at G the centre of the vertical fouth dial, defcribe it on the board E D C. Befides, on a circular plate I K defcribe an equinoctial dial, and by a flit *c d* in the XII o'clock line, from the edge to the centre, put it on the gnomon F G, as far as the flit will admit. The fame gnomon will fhew the fame hour on each of thofe dials.

To draw all the primary Dials *on the fame block or poft.*—

1. Let the plane A B C D, (*fig.* 20.) in the proper pofition of the block, be fuppofed horizontal; and thereon defcribe a horizontal dial. See *Horizontal* Dial.

2. Draw the right lines E M and F L parallel to D C, which, accordingly, in the proper pofition of the block, will be parallel to the horizon: then let the plane B N M C make an angle with E M, equal to the elevation of the pole C M E; and thereon defcribe an upper polar dial.

3. Let the oppofite plane, A D E, make with E M an angle D E M, equal to the elevation of the equator; and on this draw an upper equinoctial dial.

4. Let the plane, K L H I, make with F L an angle H L F, equal to the elevation of the equator; and on this infcribe a lower equinoctial dial.

5. Let the oppofite plane, F G, make with F L an angle G F L, equal to the elevation of the pole; and here draw a lower polar dial.

6. Let the plane M N K L, and the oppofite one E F, be perpendicular to F L; and on that draw a fouth dial, and on this a north dial.

7. On the plane E M L F defcribe a weft dial; and on the oppofite plane an eaft dial.

If, then, the block be so placed, as that the plane M N K L looks to the south, and the plane of the meridian bisect it in the line of 12 o'clock in the horizontal dial A B C D, and south dial M N K L, all the hours of the day will be indicated by several planes at once.

Dials, *Secondary*, are all those drawn on the planes of other circles, besides the horizon, prime vertical, equinoctial, and polar circles; or those which either decline, incline, recline, or deincline.

Dials, *Declining*, are erect or vertical dials, which decline from any of the cardinal points; or they are such as cut either the plane of the prime vertical, or of the horizon, at oblique angles.

The use of declining dials is very frequent; as the walls of houses, whereon dials are usually drawn, commonly deviate from the cardinal points.

Of declining dials there are several kinds, which are denominated from the cardinal points; which they seem most to respect, but from which they have a real declination: decliners from the south and from the north, as a south-east decliner, a south-west decliner, a north-east decliner, and a north-west decliner, and even decliners from the zenith.

To draw a vertical declining Dial *trigonometrically.*

1. The declination of the plane, and the elevation of the pole of the place, being given; to find the angle formed in the centre of the dial, by the meridian and substyle.

Canon. As the whole sine is to the tangent of the complement of the height of the pole of the place G F (*fig.* 21.) so is the sine of the angle of the declination of the plane G F D, to the tangent G D, of the angle required G A D.

2. The declination of the plane being given, and the elevation of the pole of the place, to find the angle formed in the centre of a vertical declining dial, by the substyle and axis.

Canon. As the whole sine is to the sine of the complement of the elevation of the pole G F; so is the sine of the complement of the declination of the plane D G F, to the side D F, the sine of the angle D A B required.

3. The declination of the plane, and the elevation of the pole, given; to find the difference of longitudes, that is, the arc of the equator, comprehended between the meridian of the place and the meridian of the plane.

Canon. As the whole sine is to the sine of the height of the pole of the place, so is the tangent of the complement of the declination of the plane, to the tangent of the complement of the difference of longitudes.

4. The angle of the difference of longitudes, and that of the axis with the substyle, being given; to find the angles formed in the centre of a vertical declining dial, between the substyle and hour-lines.

This problem admits of three cases; for the hour-lines, whose angles are sought, may be either, 1. Between the meridian and substyle; or, 2. Beyond the substyle; or, 3. On that side of the meridian where the substyle is not. In the two first cases, the difference is to be taken between the sun's distance from the meridian that hour, and the angle of the difference of longitudes found by the last problem; and in the third case, the sum of those two angles is to be taken, and the following canon used.

Canon. As the whole sine is to the sine of the angle between the axis and substyle, so is the tangent of the difference of the sun's distance from the meridian, and the difference of longitudes, or of the sum of those two angles, to the tangent of the angle required.

5. The angle formed by the substyle, with the hour-lines, and that of the substyle with the meridian, given; to find the angles formed between the meridian and hour-lines in the centre of vertical declining dials.

1. The angles of the hour-lines between the meridian and substyle are found by subtracting the angle formed by the substyle with the hour-line from the angle formed by the substyle with the meridian.

2. The angles beyond the substyle, and on the side opposite to that of the meridian, are found by adding those two angles.

3. Those on the other side of the meridian are found by taking their difference.

To describe a vertical Dial, *declining from the south to the east* or *west geometrically.* — Find the declination of the plane, as already taught, under the article Declinator. Then draw upon a paper an horizontal dial, supposing the line of contingency of the horizontal with the equinoctial plane to be G H (*fig.* 22.) through the point E, wherein the meridian line A E cuts the same, draw a right line I K, making with G H an angle H E K, equal to the declination of the given plane. Thus, as G H represents the intersection of the prime vertical with the horizon, I K will be the intersection of the declining plane and the horizon; whence we also conceive, that the part I E must be raised above G E, in case the given plane decline to the west; or it must be depressed below the same G E, in case it decline to the east. Draw a right line parallel to the horizon on the given plane, or wall, to answer to I K; and assuming a point therein answering to E, set off from the right line I K on the paper the several horary distances E 1, E 2, E 3, &c. Then from the point E erect a perpendicular E C, equal to the distance of the centre of the horizontal dial, from its line of contingency. Draw lines thence to the several points of the hour-lines E 1, E 2, E 3, &c. let fall a perpendicular A D, from the centre of the horizontal dial A, to the line of contingency I K, and transfer the distance E D, from the point E upon the wall: then will C D be the substylar line.

Wherefore, joining A D and D C at right angles, the hypothenuse A C will be an oblique index, to be fastened on the wall in the point C, according to the angle D C A.

To construct a vertical Dial, *declining from the south towards the east or west, by the globe.* — Elevate the pole to the latitude of the place, and screw the quadrant of altitude to the zenith. If the dial declines towards the east, count the degrees of declination in the horizon from the east point towards the north, and bring the lower end of the quadrant to that degree of declination, at which the reckoning ends. Then bring any meridian (*e. gr.* the first meridian) directly under the graduated edge of the upper part of the brazen meridian, and set the hour index to XII at noon. Turn the globe eastward on its axis, the quadrant of altitude being kept to the degree of declination in the horizon, and observe the degrees cut by the first meridian in the quadrant of altitude, counted from the zenith, as the hour index comes to XI, X, IX, &c. in the forenoon; and the degrees, then cut in the quadrant by the first meridian, are the respective distances of the forenoon hours from XII on the plane of the dial. For the afternoon hours, turn the quadrant of altitude round the zenith till it comes to the degree in the horizon opposite to that where it was placed before, or as far from the west point towards the south as it was at first from the east towards the north; and turn the globe westward on its axis, till the first meridian comes to the brazen meridian, and the hour index to XII; then turning the globe westward to the afternoon hours I, II, III, &c. the first meridian will cut the quadrant of altitude in the respective number of degrees from the zenith, that each of these hours is from XII on the dial; and the limit of this dial will be determined by the hour-

index, when the firſt meridian goes off the quadrant at the horizon, both in the forenoon and afternoon. Lay down theſe hour-diſtances on the dial plane, either by dividing a ſemicircle into two quadrants, beginning at the hour line of XII, or by the line of cords, as directed under *horizontal* DIAL. As the ſubſtyle makes an angle with the meridian line in this kind of dials, falling among the forenoon hour-lines in an eaſt decliner, and among thoſe in the afternoon in a dial declining towards the weſt, its diſtance may be found in the former, by counting the degrees of the declination of the dial in the horizon from the eaſt point towards the north, and bringing the lower end of the quadrant of altitude to that degree of declination where the reckoning ends; then turn the globe till the firſt meridian cuts the horizon in the like number of degrees, counted from the ſouth point toward the eaſt; and the quadrant and firſt meridian will croſs one another at right angles, and the number of degrees of the quadrant, intercepted between the firſt meridian and the zenith, is equal to the diſtance of the ſubſtyle line from the 12 o'clock line; and the number of degrees of the firſt meridian, which are intercepted between the quadrant and the north pole, is equal to the elevation of the ſtyle above the plane of the dial. If the dial declines weſtward from the ſouth, count that declination from the eaſt point of the horizon towards the ſouth, and bring the quadrant of altitude to the degree in the horizon at which the reckoning ends; both for finding the forenoon hours, and diſtance of the ſubſtyle from the meridian; and for the afternoon hours bring the quadrant to the oppoſite degree in the horizon, as far from the weſt towards the north; and then proceed as above. The north dial declining eaſt or weſt by the ſame number of degrees may be eaſily had from the former, by only extending the hour-lines, ſtyle, and ſubſtyle, quite through the centre; for thus the ſouth-eaſt decliner will produce the north-weſt decliner, and the ſouth-weſt decliner the north-eaſt decliner. Ferguſon, lib. cit.

To draw a vertical DIAL, *declining from the north towards the eaſt and weſt.*—Take the declination of the planes, as already taught; then, as north dials are only ſouth dials inverted, draw a vertical dial declining from the ſouth, and invert it in ſuch a manner, as that the centre C looks to the horizon, and the point E to the zenith; and the hours on the right hand ſet off towards the left, and contrarywiſe, omitting all hour-lines, which in ſuch a plane cannot be ſhewn.

For the practice, the beſt way is, after drawing a ſouth decliner upon paper, to prick the ſeveral points thereof through with a pin; then applying the face of the paper to the wall, the back ſide thereof will ſhew you all the points neceſſary for the north declining dial.

DIALS, *Inclined*, are thoſe drawn on planes not erect, but inclining, or leaning forward towards the ſouth, or ſouthern ſide of the horizon, in an angle, either greater or leſs than the equinoctial plane.

Such an inclined plane may be conceived by ſuppoſing one part of the plane of the equator lifted up towards the zenith, and the other depreſſed towards the nadir; and thus to revolve upon a line drawn from the eaſt to the weſt point of the horizon.

DIAL, *To draw an inclined.* 1. The inclination of the plane as DC (*fig.* 23.) being found by a declinator, as taught under DECLINATOR; if it fall between the equinoctial plane CE, and the vertical one CB, in ſuch manner as that the angle of inclination DCA is greater than the elevation of the equator ECA; on the upper ſide draw a north dial, and on the lower a ſouth dial, to an elevation of the equator, which is equal to the aggregate of the elevation of the equator of the given place, and the complement of the inclination to a quadrant.

2. If the inclined plane CF fall between the horizontal one CA, and the equinoctial CE, ſo as that the angle of inclination FCA, is leſs than the elevation of the equator ECA, deſcribe an horizontal dial to an elevation of the pole, equal to the aggregate of the elevation of the pole of the given place, and the inclination of the plane. Dials, thus inclined, are drawn after the ſame manner as primary dials; except, that the index in the former caſe muſt be fitted under the angle ADC; and in the latter, under the angle DFC; and that the diſtance of the centre of the dial from the line of contingency, in the former caſe, is DC, and in the latter FC.

DIALS, *Reclining*, are thoſe drawn on planes not erect, but reclined, or leaning backwards from the zenith towards the north, in an angle greater or leſs than the polar plane. A reclined plane may be conceived by ſuppoſing one part of the polar plane raiſed towards the zenith, and the other depreſſed towards the nadir; and thus revolving about a line drawn from eaſt to weſt. To find the reclination of a plane, ſee RECLINATION.

DIAL, *To draw a reclining.* 1. If the reclined plane HC fall between the vertical plane BC, and the polar plane IC, ſo as that the angle of reclination BCH is leſs than the diſtance of the pole from the zenith BCI, deſcribe two vertical ſouth and north dials to an elevation of the equator equal to the difference between the elevation of the equator of the given place, and the angle of reclination. 2. If the reclined plane, as KC, fall between the polar plane IC, and the horizontal one CL, ſo as that the angle of reclination BCK is greater than the diſtance of the pole from the zenith ICB, deſcribe an horizontal dial thereon to an elevation of the pole, equal to the difference between the angle of reclination, and the elevation of the equator of the given place.

To draw inclining and reclining DIALS *trigonometrically.*—The inclination and reclination of the plane, and the elevation of the pole, being known, to find the angles made in the centre of an inclining or reclining dial, by the meridian and hour lines.

Such dial is properly an horizontal dial, for a latitude equal to the particular elevation of the pole on the plane of the dial. Its angles, therefore, are found by the canon laid down for horizontal dials.

As to the elevation of the pole on the dial plane, it is thus found: the plane being inclined, either its inclination is greater than the elevation of the pole of the place, or leſs; or it is equal thereto. In the two firſt caſes, for upper ſouth, or lower north dials, the particular elevation of the pole on the plane is had by taking the difference between the elevation of the pole of the place, and the inclination of the plane; and in the latter caſe, the dial is a polar dial, wherein the hour-lines will be parallel, by reaſon that the plane being placed on the axis of the world, neither of the poles can be repreſented thereon.

For upper north, and lower ſouth dials. 1. If the inclination be greater than the complement of the elevation, the complement of the inclination muſt be added to the complement of the elevation. 2. If it be leſs, the inclination muſt be added to the elevation. 3. If it be equal, the dial will be an equinoctial dial, wherein the angles at the centre will be equal to the ſun's diſtance from the meridian.

DIALS, *Deinclined*, are thoſe which both decline and incline, or recline. See DECLINERS.

The uſe of inclined, reclined, and eſpecially deinclined

 dials,

dials, is very rare; the geometrical and trigonometrical construction of these last, therefore, as being somewhat intricate, we here choose to omit, and refer such as may have a fancy for such a dial, to an universal mechanical method of drawing all kinds of dials here subjoined

An easy method of describing a DIAL *on any kind of plane, by means of an equinoctial* DIAL, *or circle* —Suppose, *e. gr.* a dial required on an horizontal plane: if the plane be immoveable as A B D C (*Plate* II. *fig.* 24.) find a meridian line G F; or, if moveable, assume the meridian at pleasure. Then, by means of the triangle E K F, whose base is applied on the meridian line, raise the equinoctial dial H, till the index G I becomes parallel to the axis of the world (which is had if the angle K E F be equal to the elevation of the pole), and the 12 o'clock line on the dial hang over the meridian line of the plane, or the base of the triangle. If then, in the night-time, a lighted candle be successively applied to the axis G I, so as the shadow of the index, or style G I, fall upon one hour-line after another; the same shade will mark out the several hour-lines on the plane A B C D.

Noting the points, therefore, on the shadow, draw lines through them to G; then an index being fixed in G, according to the angle I G F, its shadow will point out the several hours by the light of the sun.

If a dial were required on a vertical plane, having raised the equinoctial circle, as above directed, push forward the index G I, till the tip thereof, I, touch the plane.

If the plane be inclined to the horizon, the elevation of the pole should be formed on the same; and the angle of the triangle K E F should be made equal thereto.

See a new method of constructing sun-dials, for any given latitude, without the assistance of dialling scales, or logarithmic calculations, by Mr. Ferguson, in the Phil. Transf. vol. lvii. for 1767, art. 36, and in his Select Exercises, p. 95.

Note. Beside the several species of dials above-mentioned, with are said to be with centres, there are others, called dials without centres. See CENTER *of a Dial.*

DIALS *without centres,* are those whose hour-lines do really converge, but so slowly, that the centre towards which they converge cannot be expressed in the given plane.

DIALS, *Horizontal, without centres,* are to be made for places, the elevation of whose pole is either very small, or very great.

DIALS, *Vertical, without centres,* are for places, the elevation of whose pole is very great.

DIALS, *For the furniture of.* See FURNITURE.

DIAL, *Quadrantal.* See *Horodictical* QUADRANT.

DIAL, *Reflecting.* See REFLECTING *Dial.*

DIAL, *Cylindric,* is represented in *Plate* III. *fig.* 27. This dial may be delineated on paper, and then pasted round a cylinder of wood, and it will shew the time of the day, the sun's place in the ecliptic, and his altitude at any time of observation. Draw the right line *a* A B (*fig.* 28.) parallel to the top of the paper, and with any opening of the compasses on the centre *a* describe the quadrant A E, and graduate it. Draw the right line A C at right angles to *a* A B, and touching the quadrant A E at the point A. From the centre *a* draw right lines through as many degrees of the quadrant as are equal to the sun's altitude at noon, on the longest day of the year, at the place for which the dial is to serve; which altitude at London is nearly 62 degrees; continue these right lines till they meet the tangent line A C; and from the points of concourse, draw straight lines across the paper, parallel to the first right line A B, and these will be the parallels of the sun's altitude in whole degrees, from sun-rise to sun-set, on all the days of the year. These parallels of altitude must be drawn out to the right line B D, which must be parallel to A C, and as far from it as is equal to the intended circumference of the cylinder on which the paper is to be pasted. Divide the space between the right lines A C and B D, at top and bottom, into twelve equal parts, for the twelve signs of the ecliptic; and from one mark to the opposite one, draw right lines parallel to A C and B D; and place the characters of the twelve signs in the twelve spaces at the bottom, beginning with ♑ Capricorn, and ending with ♓ Pisces. These spaces should likewise be divided by parallel lines into halves and quarters. At the top of the dial make a scale of the months and days of the year, so that the days may stand over the sun's place, found in an Ephemeris, for each of them in the signs of the ecliptic. Compute the sun's altitude for every hour, in the latitude of your place, or take it from a table, when he is in the beginning, middle, and end of each sign of the ecliptic; and in the upright parallel lines, at the beginning and middle of each sign, make marks for these altitudes among the horizontal parallels, reckoning downward in the order of the numeral figures at the right-hand, answering to the like divisions of the quadrant at the left. Through these marks draw the curve hour-lines, and set the hours to them, as in the figure, reckoning the forenoon hours downward, and the afternoon hours upward. The sun's altitude may also be taken and laid down for the half hours and quarters. Then cut off the paper at the left-hand on which the quadrant was drawn, close by the right line A C, and all the paper at the right-hand, close by the right line B D, and cut it also close by the top and bottom horizontal lines, and it will be fit for pasting round the cylinder. This cylinder, (*fig.* 27.) is hollow for holding the style D E, when it is not used. The style must stand out, perpendicular to the side of the cylinder, just over the right line A B, (*fig.* 28.) where the parallels of altitude begin, and its length, or distance of the point *e* from the cylinder, must be equal to the radius *a* A of the quadrant A E (*fig.* 28.) When this dial is used, the horizontal foot B C is placed on a level table, or hung by the ring F, where the sun shines, and the horizontal top A D, which is made moveable, is turned till the style stands just over the day of the month. Then the cylinder is turned round, till the shadow of the style falls upon it, parallel to the upright lines which divide the signs; or till the shadow is parallel to a supposed axis in the middle of the cylinder; and then the point, or lowest end of the shadow, will fall upon the time of the day, as it is before or after noon, among the curve hour-lines, and will shew the sun's altitude at that time among the cross parallels of altitude, encompassing round the cylinder; and it will also shew in what sign of the ecliptic the sun is at that time, and the degree may be nearly estimated by the eye. Ferguson.

When the sun is in the equinoctial, and has no declination, his altitude may be easily found by the following proportion. As radius is to the cosine of the latitude, so is the cosine of the hour from noon to the sine of the altitude: but if he has north or south declination, say, as radius is to the sine of the declination, so is the sine of the latitude to the sine of the sun's altitude at six o'clock. For the sun's altitude at other hours the two following proportions must be used, *viz.* 1. As the cosine of the hour from the meridian to radius, so is the tangent of the latitude to the tangent of a fourth arc, from which the declination is to be subtracted, when north, and to which it is to be added, when south, for a fifth arc. The supplement of the sun's declination, added to the fourth arc, must be used for this fifth arc, when they exceed a quadrant, in finding the altitudes before and after six.

2. As the fine of the fourth arc is to the cofine of the fifth arc, fo is the fine of the latitude of the place to the fign of the altitude for the given hour and declination.

The altitude in the middle of the fign may either be had by taking the arithmetic mean between the next greateft and leaft, or by computation in the manner above directed. Leybourn's Dialling, Tract vi. p. 23, &c.

To find the altitude by the globe, fee GLOBE.

DIAL, *Portable, on a card,* is reprefented in *fig.* 29. and may be eafily conftructed. Draw the occult line AB (*fig.* 30.) parallel to the top of the card, and crofs it at right angles with the fix o'clock line ECD: then upon C, as a centre, with the radius CA, defcribe the femicircle AEL, and divide it into twelve equal parts, beginning at A, as A *r*, A *s*, &c. and from thefe points of divifion draw the hour-lines *r*, *s*, *t*, *u*, *v*, *w*, and *x*, all parallel to the fix o'clock line EC. If each part of the femicircle be fubdivided into four equal parts, they will give the half hour lines and quarters, as in *fig.* 29. Draw the right lines ASD *o*, making the angle SAB equal to the latitude of the place. Upon the centre A defcribe the arc RST, and fet off upon it the arcs SR and ST, each equal to $23\frac{1}{2}$ degrees, for the fun's greateft declination, and divide them into $23\frac{1}{2}$ equal parts, as in *fig.* 29. Through the interfection D of the lines ECD and AD *o* draw the right line FDG at right angles to AD*o*. Lay a ruler to the points A and R, and draw the line ARF through $23\frac{1}{2}$ degrees of fouth declination in the arc SR; and then laying the ruler to the points A and T, draw the line ATG through $23\frac{1}{2}$ degrees of north declination in the arc ST; fo fhall the lines ARF and ATG cut the line FDG in the proper length for the fcale of months. Upon the centre D, with the radius DF, defcribe the femicircle F *o* G, which divide into fix equal parts F*m*, *mn*, *no*, &c. and from thefe points of divifion draw the right lines *m h*, *n i*, *pk*, and *q l*, each parallel to *o* D. Then fetting one foot of the compaffes in the point F, extend the other to A, and defcribe the arc A *z* H for the tropic of ♑; with the fame extent, fetting one foot in G, defcribe the arc AEO for the tropic of ♋. Next fetting one foot in the point *h*, and extending the other to A, defcribe the arc ACI for the beginnings of the figns ♒ and ♐; and with the fame extent, fetting one foot in the point *l*, defcribe the arc AN for the beginnings of the figns ♊ and ♌. Set one foot in the point *i*, and having extended the other to A, defcribe the arc AK for the beginnings of the figns ♓ and ♏; and with the fame extent fet one foot in *k*, and defcribe the arc AM for the beginnings of the figns ♉ and ♍. Then fetting one foot in the point D, and extending the other to A; defcribe the curve AL for the beginnings of ♈ and ♎; and the figns will be finifhed. This done, lay a ruler from the point A over the fun's declination in the arc RST, found by a table, for every fifth day of the year; and where the ruler cuts the line FDG, make marks, and place the days of the months right againft thefe marks, as in *fig.* 29. Laftly, draw the fhadow line PQ parallel to the occult line AB; make the gnomon, and fet the hours to their refpective lines, as *fig.* 29. and the dial will be finifhed.

The lines *a d*, *a b*, and *b c*, of the gnomon, muft be cut quite through the card; and as the end *a b* of the gnomon is raifed occafionally above the plane of the dial, it turns upon the uncut line *c d* as on an hinge. The dotted line AB muft be flit quite through the card, and the thread C muft be put through the flit, and have a knot tied behind, to keep it from being eafily drawn out. On the other end of this thread is a fmall plummet D, and on the middle of it a fmall bead for fhewing the hour of the day.

To rectify this dial; fet the thread in the flit right againft the day of the month, and ftretch the thread from the day of the month over the angular point, where the curve lines meet at XII; then fhift the bead to that point on the thread; and the dial will be rectified.

To find the hour of the day; raife the gnomon, and hold the edge of the dial next the gnomon towards the fun, fo that the uppermoft edge of the fhadow of the gnomon may juft cover the fhadow-line; and the bead then playing freely on the face of the dial, by the weight of the plummet, will fhew the time of the day among the hour-lines, in the forenoon or afternoon.

To find the time of fun-rifing and fetting; move the thread among the hour-lines, until it either covers fome one of them, or lies parallel betwixt any two; and then it will cut the time of fun-rifing among the forenoon hours, and of fun-fetting among the afternoon hours for that day of the year to which the thread is fet in the fcale of months.

To find the fun's declination; ftretch the thread from the day of the month over the angular point at XII, and it will cut the fun's declination, as it is north or fouth, for that day, in the proper fcale.

To find on what day the fun enters the figns; when the bead, as above rectified, moves along any of the curve lines which have the figns of the zodiac marked upon them, the fun enters thofe figns on the days pointed out by the thread in the fcale of months.

DIAL, *Univerfal, on a plain crofs*, is reprefented by *fig.* 31. and is moveable on a joint, C, for elevating it to any given latitude on the quadrant C *o* 90, as it ftands upon the horizontal board A. The arms of the crofs ftand at right angles to the middle part; and the top of it, from *a* to *n*, is of equal length with any of the arms *n e* or *m k*.

This dial is rectified, by fetting the middle line *t u* to the latitude of the place on the quadrant, the board A level, and the point N northward by the needle: thus, the plane of the crofs will be parallel to the plane of the equator. Then from III o'clock in the morning till VI, the upper edge, *k l*, of the arm, *i o*, will caft a fhadow on the time of the day on the fide of the arm *e m*; from VI till IX, the lower edge, *i*, of the arm, *i o*, will caft a fhadow on the hours, on the fide *o q*. From IX in the morning to XII at noon, the edge, *a b*, of the top part, *a n*, will caft a fhadow on the hours on the arm *n e f*; from XII to III in the afternoon, the edge *c d* of the top part will caft a fhadow on the hours of the arm *k l m*; from III to VI in the evening, the edge *g h* will caft a fhadow on the hours on the part *p q*; and from VI till IX, the fhadow of the edge, *e f*, will fhew the time on the top part *a n*. The breadth of each part, *a b*, *e f*, &c. muft be fo great, as never to let the fhadow fall quite without the part or arm on which the hours are marked, when the fun is at his greateft declination from the equator.

To determine the breadth of the fides of the arms which contain the hours, fo as to be in juft proportion to their length; make an angle, ABC, (*fig.* 32.) of $23\frac{1}{2}$ degrees, which is equal to the fun's greateft declination; and fuppofe the length of each arm, from the fide of the long middle part, and alfo the length of the top part above the arms, to be equal to B*d*. Then, as the edges of the fhadow, from each of the arms, will be parallel to B*e*, making an angle of $23\frac{1}{2}$ degrees with the fide B*d*, of the arm, when the fun's declination is $23\frac{1}{2}°$: it is plain, that if the length of the arm be B*d*, the leaft breadth that it can have, to keep the edge B*e* of the fhadow, B*egd*, from going off the fide of the arm, *de*, before it comes to the end of it, *ed*, muft be equal to *ed* or *d*B. But, in order to keep the fhadow within the quarter divifions of the hours, when

 it

it comes near the end of the arm, the breadth of it ſhould be ſtill greater, ſo as to be almoſt doubled, on account of the diſtance between the tips of the arms.

The hours may be placed on the arms, by laying down the croſs, *abcd (fig. 33.)* on a ſheet of paper; and with a black lead pencil, held cloſe to it, drawing its ſhape and ſize on the paper. Then take the length *ae* in the compaſſes, and with one foot in the corner *a*, deſcribe with the other the quadrant *ef*. Divide this arc into ſix equal parts, and through the points of diviſion draw right lines *ag*, *ah*, &c. continuing three of them to the arm *ce*, which are all that can fall upon it; and they will meet the arm in thoſe points through which the lines that divide the hours from each other, as in *fig. 31*, are to be drawn right acroſs it. Divide each arm, for the three hours contained in it, in the ſame manner; and ſet the hours to their proper places, on the ſides of the arms as they are marked in *fig. 33*. Each of the hour ſpaces ſhould be divided into four equal parts, for the half hours and quarters, in the quadrant *ef*; and right lines ſhould be drawn through theſe diviſion-marks in the quadrant, to the arms of the croſs, in order to determine the places thereon, where the ſubdiviſions of the hours muſt be marked.

This is a very ſimple kind of univerſal dial; it is eaſily made, and has a pretty uncommon appearance in a garden. Ferguſon.

Dials, *Refracted*, are ſuch as ſhew the hour by means of ſome refracting tranſparent fluid.

If a pin or ſtick be ſet up, or any point be aſſigned in a concave bowl or diſh for the centre of the dial, let an horizontal dial be applied over the ſame, aſſigning the meridian line on the edges of the bowl, and marking out the reſt of the hour-lines alſo on the edges of the bowl; take away the horizontal dial, and elevate a ſtring or thread from the end of the ſaid pin over the meridian line, as much as is the latitude or elevation of the pole of the place: then, by bringing the thread to caſt a ſhadow on any hour point formerly marked out on the edges of the bowl, by a candle or the like, that ſhade in the bowl is the true hour-line; and if the bowl be full of water, &c. when this is done, it will never ſhew the true hour by the ſhadow of the top of the pin but when it is filled again with the ſame liquor.

Dial, *Ring*, is a kind of dial, uſually ſmall and portable, conſiſting of a braſs ring or rim, ſeldom exceeding two inches in diameter, and one-third of an inch in breadth. In a point of this rim there is a hole, through which the ſunbeams being received, make a lucid ſpeck on the concavity of the oppoſite ſemicircle, which gives the hour of the day in the diviſions marked therein.

Theſe diviſions are made by deſcribing a circle, *(Plate IV. fig. 34.)* to repreſent the ring, and drawing an horizontal chord E F; with this as radius deſcribe the quadrant FD, and graduate it; and through the ſeveral degrees which mark the ſun's altitude for every hour at the time of the equinox, draw lines from E to the oppoſite part of the circle, and there ſet the correſponding figures. Thus the XII o'clock line will paſs through 38° 38′, the co-latitude of the place; and the XI and I line through 36° 56′; the X and II through 32° 36′; the IX and III through 26° 5′; the VIII and IV through 18° 8′; and the VII and V through 9° 17′. This may be eaſily calculated by the globe.

But it only holds good about the times of the equinox. To have the dial perform throughout the whole year, the hole is made moveable, and ſigns of the zodiac, or the days of the month, are marked on the convex ſide of the ring, by taking, *e.g.* E T and E *t (fig. 34.)* on each ſide of E equal to double the ſun's declination when he enters any particular ſign, as Taurus or Piſces; and there marking the character of the ſaid ſign, or correſponding month, and ſo for all the others; and by means of theſe the dial is rectified for the time. It is evident, from a view of the figure, that E XII ♌ is = F E XI I = the altitude of the ſun in the equinox; but T XII E is equal to the ſun's declination in Taurus, becauſe it is an angle in the circumference ſtanding upon an arc, which is double the declination; and therefore T XII ♌ is equal to the meridian altitude when the ſun enters Taurus; and a ray paſſing through the hole at T will mark the XII o'clock hour of that day; but this dial will not point out the other hours exactly: becauſe T III *d* exceeds E III *d*, the equinoctial hour by the angle of declination; and ſo of the reſt. Some have contrived to remedy this inconvenience, by making the concave ſurface of the ring wider, and deſcribing upon it ſeven circles, the middle one to repreſent the equinoctial, and the extremes the tropics; and in theſe circles they have marked the forenoon and afternoon hours from a table of altitudes.

To uſe it, put the moveable hole to the day of the month, or the degree of the zodiac the ſun is in; then ſuſpending it by the little ring, turn it towards the ſun, till his rays, as before, point out the hour among the diviſions on the inſide.

Univerſal or *aſtronomical Ring* Dial, is a ring-dial, which ſerves to find the hour of the day in any part of the earth; whereas the former is confined to a certain latitude. Its figure ſee repreſented in *Plate IV. fig. 35*.

It conſiſts of two rings or flat circles, from two to ſix inches in diameter, and their breadth, &c. proportionable. The outward ring, A, repreſents the meridian of any place you are at, and contains two diviſions of 90° each, diametrically oppoſite to one another, ſerving the one from the equator to the north, the other to the ſouth pole. The inner ring repreſents the equator, and turns exactly within the outer, by means of two pivots in each ring at the hour XII.

Acroſs the two circles goes a thin reglet or bridge, with a curſor C, that ſlides along the middle of the bridge. In the curſor is a little hole for the ſun to ſhine through. The middle of this bridge is conceived as the axis of the world, and the extremities as the poles; and on the one ſide are drawn the ſigns of the zodiac, and on the other the days of the month. On the edge of the meridian ſlides a piece, to which is fitted a ring to ſuſpend the inſtrument by.

In this dial, the diviſions on the axis are the tangents of the angles of the ſun's declination, adapted to the ſemidiameter of the equator as radius, and placed on either ſide of the centre: but inſtead of laying them down from a line of tangents, a ſcale of equal parts may be made, whereof 1000 ſhould anſwer exactly to the length of the ſemi-axis, from the centre to the inſide of the equinoctial ring; and then 434 of theſe parts may be laid down toward each end from the centre, which would limit all diviſions on the axis, becauſe 434 is the natural tangent of 23° 29′. And thus, by a nonius fixed to the ſliding-piece, and taking the ſun's declination from an ephemeris, and the tangent of that declination from the table of natural tangents, the ſlider might be always ſet true within two minutes of a degree. And this ſcale of 434 equal parts might be placed right againſt the $23\frac{1}{2}°$ of the ſun's declination, on the axis, inſtead of the ſun's place, which is there of little uſe. For then the ſlider might be ſet in the uſual way, to the day of the month, for common uſe; but to the natural tangent of the declination, when great accuracy is required.

*Uſe of the Univerſal Ring-*Dial.—Place the line *a* (on

 the

the middle of the fliding-piece) over the degree of latitude of the place (*e. gr.* $51\frac{1}{2}$° for London) put the line which croffes the whole of the curfor to the degree of the fign, or day of the month. Open the inftrument fo as that the two rings be at right angles to each other, and fufpend it by the ring H, that the axis of the dial, reprefented by the middle of the bridge, may be parallel to the axis of the world. Then turn the flat fide of the bridge towards the fun, fo that his rays, ftriking through the little hole in the middle of the curfor, may fall exactly on a line drawn round the middle of the concave furface of the inner ring; in which cafe the bright fpot fhews the hour of the day in the faid concave furface of the ring. Note, the hour of XII is not fhewn by this dial, becaufe the outer circle being then in the plane of the meridian, hinders the fun's rays from falling on the inner; nor will this dial fhew the hour when the fun is in the equinoctial, becaufe his rays then fall parallel to the plane of the inner circle.

DIAL, *Univerfal Meridian*, fo called by Mr. F. Wollafton, F. R. S., who has fhewn how to conftruct it, fo as to admit of being fet to any latitude, and adapted for fhewing the mean folar time of noon by infpection, without any calculation. Although this dial will not give the time at any other part of the day, it will always fhew the inftant when it is 12 o'clock, without any regard to the equation of time; as well the inftant of apparent noon, and confequently the equation of time alfo, which is always the difference between the two. This method is defcribed in a 4to. pamphlet, entitled "Directions for making an Univerfal meridian Dial," &c. and publifhed for Wilkie in 1793.

Nocturnal, or *Night* DIAL, is that which fhews the hours of the night.

Of this there are two kinds; lunar and fiderial.

Moon-DIAL, or *Lunar*-DIAL, is that which fhews the hour of the night by means of the light, or fhadow, of the moon, projected thereon from an index.

To defcribe a Moon DIAL.—Suppofe, *e. gr.* an horizontal moon-dial required: draw, firft, an horizontal fun-dial; then erect two perpendiculars, A B and C D (*Plate* II. *fig.* 25.) to the line of XII o'clock; and, dividing the interval GF into twelve equal parts, through the feveral points of divifion draw lines parallel thereto: now, appropriating the firft line CD to the day of the new moon, and the fecond to the day when the moon comes an hour later to the meridian than the fun; their interfections with the hour-lines will give points, through which to draw a curve line XII XII for the meridian line of the moon. After the like manner determine the other hour-lines, I I, II II, III III, &c. which the fhadow of the moon, projected from the ftyle of the dial, interfects at the refpective hour; then blot out the hour-lines of the fun dial, together with the perpendiculars whereby the lunar hours were drawn, and divide the interval GF, by other parallel lines, into fifteen equal parts, anfwering to the fifteen days between new and full moon; laftly, to thefe lines write the feveral days of the moon's age.

Now the moon's age being learnt from a calendar, the interfection of the line of the moon's age with the lunar hour-lines, will give the hour of the night.

After the fame manner may any other fun-dial be converted into a moon-dial.

To draw a portable Moon DIAL.—On a plane, that may be raifed according to the elevation of the equator, defcribe a circle AB (*fig.* 26.) and divide its circumference into $29\frac{1}{2}$ equal parts: from the fame centre C defcribe another moveable circle DE, which divide into twenty-four equal parts, or hours; in the centre C erect an index, as for an equinoctial dial.

This dial being duly placed, after the manner of an equinoctial dial, and the XII o'clock line brought to the day of the moon's age; the fhadow of the index will give the hour.

To ufe a Solar as a Lunar-DIAL, *i. e. to find the hour of the night by a* fun-dial.—Obferve the hour which the fhadow of the index points at by moon-light, find the moon's age in the calendar, and multiply the number of days by $\frac{4}{5}$, the product is the number of hours to be added to the hour fhewn by the fhadow, throwing out 12, if it exceed, to give the hour required: the reafon of which is, that the moon comes to the fame horary circle later than the fun by about four-fifths of an hour every day; and at the time of new moon the folar and lunar hour coincide. Or thus: If you know the time of the moon's fouthing, count how many hours and minutes the fhadow on the dial falls fhort of 12 o'clock; fubtract thefe from the time of her fouthing, for the hour of the night. But if the fhadow fall beyond 12, add thefe hours and minutes (on the dial) to the time of her fouthing, rejecting 12, if it exceed: and you have the hour of the night.

DIALS, *Placing of*. Every dial muft be fo placed, that the upper edge of the ftyle may point directly to the pole, and that the horizontal line be perfectly level, and that it have its proper declination and inclination; and in an upright dial, that the 12 o'clock line be perpendicular to the horizon. Having prepared the plane on which the dial is to reft, the hour may be found with tolerable accuracy by a large equinoctial ring-dial, to which a watch is to be fet; and then the dial may be fixed by the watch at leifure. But in order to have the time more exactly, the fun's altitude fhould be taken by a good quadrant, and the precife time of obfervation noted by a clock or watch: then the time fhould be computed for the obferved altitude, and the watch fet to agree with that time. Otherwife, take two equal altitudes of the fun in the fame day in fummer; one between feven and ten in the morning, the other between two and five in the afternoon; mark the moment of the two obfervations by a clock or watch; and if the watch fhews the obfervations to be at equal diftances from noon, it agrees exactly with the fun; if not, the watch muft be corrected by half the difference of the forenoon and afternoon intervals; and then the dial may be fet true by the watch. To find a meridian line, fee MERIDIAN.

It is neceffary to obferve, that if a dial be made according to the ftrict rules of calculation, and truly fet at the inftant, when the fun is in the meridian, it will be a minute too faft in the forenoon, and as much too flow in the afternoon, by the fhadow of the ftyle; becaufe the edge of the fhadow that fhews the time is even with the foremoft edge of the fun in the forenoon, and with his hindmoft edge in the afternoon, on the dial, whereas the fun's centre determines the time in the (fuppofed) hour circles of the heaven; and as the fun is half a degree in breadth, he takes two minutes to move through a fpace equal to his breadth; and there will be two minutes at noon in which the fhadow will have no motion at all on the dial. It likewife appears, that if the dial be fet true by the fun in the forenoon, it will be two minutes too flow in the afternoon; and *vice verfâ*. The way of remedying this error, is to fet every hour and minute divifion on the dial one minute nearer XII than the calculation requires. Every dial is alfo too faft in the forenoon and too flow in the afternoon, on account of the refraction of the fun-beams, by which the fun is raifed higher, and the fhadow brought nearer the fubftyle. Ferguson's Tables and Tracts, p. 73, &c.

DIAL-*planes*, plain fuperficies, upon which the hour-lines of dials are drawn. See DIAL.

Dial, *Siderial.* See Nocturnal.

Dial, *Tide.* See Tide-*Dial.*

Dial-*Bird*, in *Ornithology*, the *dial-grekle* of Latham, and *Saularis Gracula* of Gmelin, which fee.

Dial-*Plate*, is the face of an inftrument which fhews the time or hour of the day either by means of a moving hand or index, or by the fhadow of a gnomon that falls upon it; hence we hear of clock-dials, watch-dials, and fun-dials.

The clock makers have alfo given the name of dials to a particular fort of time-pieces; *viz.* fuch as are generally ufed in kitchens, fhops, &c. They are eight day pendulum movements, which do not ftrike, but only fhew the hours and minutes.

The dial-plates of clocks and watches are almoft univerfally divided into twelve hours, which are denoted by Roman numerals, and each of thofe hours is fubdivided into five minutes, fo as to divide the whole circumference into fixty equal parts or minutes. Inftead of Roman numerals, the hours of fome clocks and watches are often indicated by the common numerical or Arabic figures; and fometimes they are even fancifully indicated by the letters of fome particular word, or name. We have fometimes, though feldom, feen the dial plate of a clock divided into 24 hours, or twice 12; and in them the hour hand of courfe goes round once only in 24 hours. In certain particular time-pieces, the hours on the dial plate are difpofed in a fpiral manner; fo that four or fix of them fill up the whole circumference, and the reft are marked under thofe, and nearer to the centre (as in Dr. Franklin's clock, and others); the hour hand then going round the whole circumference in lefs time than 12 hours. See the next article.

Dial-*Plate* of a *Clock* or *Watch*, called alfo the *face*, is that fixed plate which contains the divided circles of hours, minutes, and feconds, pointed to by the refpective hands, and which is pinned to the frame by the dial-pillars. This plate, in the ancient machines, was made of brafs, engraved into various devices, and filvered, fometimes only partially; but the modern makers prefer enamel to filvering, and that either real or imitative, according to the price intended to be charged for the workmanfhip. The maker's name is alfo ufually put on fome confpicuous part of the dial-plate; and if the machine is contrived fo as to have the repeating mechanifm, the days of the month, the moon's age, the days of the week, or fun's place in the ecliptic, &c. The divided circles containing thefe, or fome of thefe, are introduced, and perforations to fhew the divifions of other fmaller plates, revolving within or behind the principal plate, are frequently fuperadded.

Dial-*Work* of a *Clock* or *Watch*, properly fpeaking, is that work which relates to the dial-plate, hands, dial-pillars, and fmall revolving plates, that are fometimes calculated to perform their revolutions in certain given periods of time; but, becaufe the refpective periods, and relative fituations of the moving parts depend on the motion-work, or wheel-work, contained between the dial-plate and the frame, the term dial-work may be faid to include alfo the motion-work, on which depend the figure, dimenfions, and circles of indication on the dial-plate, as well as the number of indicating hands. In the infancy of clock-work, there was but one hand, indicating the hours and fubdivifions of the hour, and inferted on the protruding arbor of the fufee, or barrel, made to revolve in twelve hours; but when the motion-work was introduced to fubdivide the hour more fenfibly into minute portions, it was found that any modified period of time might be reprefented by wheel-work, borrowing its motion from the going-part of the machine, without materially altering its rate of going, particularly when the motions produced are flow. Hence arofe the practice of reprefenting planetary phenomena, and of introducing various devices, either for ufe or ornament, which enhance the value, or rather the price of many clocks and watches, of which a great portion of the mechanifm is fuperfluous, and frequently renders the rate of their going unfteady. It might be confidered as unneceffary now, that clocks and watches are in every perfon's poffeffion, to give a minute detail of the circles and hands on an ordinary dial-plate; but as many of our readers may wifh to know the connection between the hour and minute hands, in regard to the mechanifm behind the dial, we beg leave to refer to *Plate* XII. of *Horology*, and to the defcriptions of an eight-days' portable clock with repeating mechanifm, under the head Clock, where the requifite information has been already given. The fame defcription is equally applicable to the dial-work of an ordinary watch: and when the feconds are fhewn by a long hand moving from the centre of the face, the calliper is fo laid down, that a cannon wheel revolves in a minute, (over a bridge that has got a tube furrounding the interior cannon wheel of the hours) in confequence of its connection with a fimilar wheel on the arbor of the wheel that ufually carries the feconds' hand out of the centre. The dials fhewn in *Plate* XXIII. already defcribed, as contrived by Dr. Franklin and Mr. Fergufon, have no motion-work, but fimply the hands, or revolving plates attached to the arbors of the going part of the clock, which we mention here with a reference to the word Clock, left the reader fhould confult our prefent article for them in vain. We have alfo defcribed the dial-work of Enderlin's equation clock, as feen in *Plate* XXIV., in *fig.* 2, of which is feen a dial with the hours, minutes, and feconds out of the centre, together with other appendages, with the account of which the curious reader will be interefted in the article already referred to. We have, however, referved for our prefent article three or four different fpecimens of dial-work, that have not been before defcribed, and that, we truft, will therefore be acceptable to the public.

Plate XXXI. of *Horology* prefents two figures, the firft of which exhibits the motion-work under the dial of a clock, that indicates the days of the week and month, together with that of the moon's age, and at the fame time reprefents the moon's phafes; and *fig.* 2, is the reprefentation of the correfponding dial, with the parts feen through the perforated parts. In *fig.* 1, the letter *a* is placed on the wheel of 72 teeth that revolves, as in common, in twelve hours, by means of its connection with the cannon pinion of fix leaves; to this wheel is attached another fmaller one, *b*, of 30 teeth, or any other convenient number, which actuates a third of fixty, *i. e.* double its number, in 24 hours exactly, but in a contrary direction, which is feen denoted by *c*. This wheel of 60 teeth has two pins projecting from its plane, feen near the fmall letter *c*, one of which only we will regard at prefent. The pin nearer to the extremity of the wheel comes in contact with a tooth *d*, projecting from the edge of the vertical bar *de*, once in every 24 hours, and lifts this bar, which is kept in a true vertical pofition by a little bridge, *e*, below, and a pin within the flit at the fuperior end, which pin is held by a fmall cock, over the plane of the twelve-hours' wheel: the confequence of this diurnal lifting is, that a jointed tooth, *f*, attached to the faid vertical-bar, takes one of the feven points of the ftar *g*, and turns the ftar till the heel of the fautoir, *h*, paffes the point of the ftar at prefent refting againft its leg, and pufhes it one-feventh part round by the action of the fmall fpring, *i*; the vertical bar then defcends by its weight, its tooth being clear of the pin in wheel *c*, till its jointed tooth, *f*, falls on the next fucceeding point of the ftar, on which

which it would reft if it had no joint; but the weight of the bar is fufficient to make this tooth, *f*, turn on its pivot or joint, till it has paffed the faid point of the ftar, after which the little fpring underneath the back part of the tooth reftores its horizontal pofition, below the point of the ftar that is to be caught the fucceeding day; and in this way, the ftar is made to revolve in feven days, by as many fudden daily leaps, and it prefents an attached plate with feven days of the week on it, as they occur, to an aperture at one of the inferior corners of the dial where the word *Monday* is now feen exhibited in *fig.* 2.

Again, the inner pin, projecting from the plane of the 24 hour wheel *c*, meeting with the curved triangular part of K*l*, which is a piece of metal moveable on a ftud at the point *l*, flides along it, and at the fame time raifes it upwards, while the jointed tooth, attached to its oppofite end, is depreffed, fo as to urge a tooth of the ferrated rim, kept in its place by the three rollers, *m*, *n*, and *a*; prefently, however, the pin of *c* comes in contact with the extreme corner of K, that points downwards, and paffing it, allows it to return from its elevated pofition, till its tail-piece meets with a pin in the fmall cock below *l*; but its weight is fufficient to make it fall with velocity enough to bend the joint of the tooth that impels the rim; therefore, a fpring is attached to the fmall cock, and acts on the back portion of the tail-piece, to give the requifite force in the fall. The tooth here has alfo a re-acting fpring, like the jointed tooth *f*, and finds its horizontal pofition by means of its action on the back part of the tooth feen refting on a pin, that prevents its falling beyond the horizontal line. Now, as the rim in queftion has 31 teeth on its interior edge, one of which is moved thus every day, it is evident, that if its plane be divided into 31 equal fpaces, they will be fo many day fpaces, to indicate the day of the month, as feen through fome convenient opening in the dial, which, for the fake of uniformity, may be juft above the point VI of the dial, as we have given it in *fig.* 2. This rim, it will be obferved, will require a monthly adjuftment by hand, that No. 1. may begin with the firft day of each month. We have, indeed, feen a contrivance, different from Enderlin's already defcribed, for making the month-plate adjuft itfelf at the end of each month, in a clock made by a Scotchman of the name of Smith, of Pittenween, in Fifefhire, and exhibited in 1808, for public infpection, at No. 27, Leicefter fquare; but as fome part of the value of the fuperb machine confifted of this contrivance, which was fhewn us in confidence, we feel not at liberty to make it public, without the proprietor's previous confent. On the rim we have been defcribing is a pin, which takes hold of one of the 12 points of the ftar *p*, the action of which is precifely the fame as that of ftar *g*, already defcribed; on a plate connected with this ftar, and revolving with it in 12 months, are the months defignated and fhewn through another opening at the inferior corner of the dial, in *fig.* 2. oppofite to that of the days. The two engraved plates of the days and months are defignated in *fig.* 1. by dotted circles only. The wheel *a*, which we have faid revolves in the fpace of 12 hours, has alfo its pin for the moon's wheel, independently of its pin for making the clock ftrike, which pin takes the interior end of the lever *q*, that carries a third jointed tooth, in every refpect like thofe defcribed, fo far as relates to the action; and whenever the interior end of the faid lever is depreffed by its pin of wheel 72, which happens once in each 12 hours, the jointed tooth pufhes a tooth of the moon's wheel, which confift of 118; hence two of thefe are actuated in the fpace of each 24 hours, and the fautoir *r* keeps this wheel fteadily to its place after each pufh; thus the moon's wheel, denoted by *s*, revolves once in 59 days, or in a period fomewhat more than two lunations. On the plane of the moon's wheel, which is a folid plate, are painted two moons diametrically oppofite each other, which appear to put on all the natural afpects fucceffively, by the help of a triangular aperture in the dial-plate, two fides of which figure are femi-circles to the radius of the moon's curvature, as reprefented in *fig.* 2, which is the fituation for Monday, July 4th 1808, when the moon's age is 12. The edge of the moon's plate, beyond the painted part, is figured twice over into $29\frac{1}{2}$ fpaces, which are the fpaces of the moon's age feen through the curved opening over the moon herfelf, at any given time. The hour and minute hands, and alfo the circles of the dial, being of the ordinary kind, require no explanation. The practical objections to the dial-work here defcribed, are, that the regularity of the maintaining power is greatly interrupted by the hourly, daily, and monthly oppofing forces to be overcome by only fhort intervals of action, particularly when the weights and fprings that conftitute the oppofing forces are confiderable, which they muft be to anfwer their purpofe; fecondly, the means ufed, though they profefs to be fimple, in as much as they avoid folar and lunar calculations for appropriate wheel-work, yet are actually more complex and expenfive than proper trains would be, without re-acting fprings, and other mechanical appendages; and, laftly, manual adjuftment of the monthly plate is requifite many times within the year, as well as occafionally a rectification of the moon's age neceffary, when the deficiency of 44 minutes 3 feconds amounts to an entire day. We might here proceed to fhew how Fergufon, Jenkins, and others, have obviated the objections we have ftated, by introducing the refpective calculations of trains into their aftronomical, or rather planetary, clocks; but as the accounts of them have been publifhed by the authors themfelves, in Fergufon's Mechanical Exercifes, and in a defcription of feveral aftronomical and geographical clocks, by Henry Jenkins, London, 1778, we will give the dial-work of a fmall portable clock, contrived by the writer of the prefent article in the year 1800, which indicates all the periods of the preceding clock, with the addition of the moon's place in the ecliptic, and of her nodes, latitude, and apogee, in a fimple and unobjectionable manner, and which is the only clock that has been made of the kind.

Fig. 1. of *Plate* XXXII. of *Horology*, fhews the motion-work of the little clock alluded to, and *fig.* 2. its dial, forming together what may be called its dial-wheel. Partly on account of the fimplicity of the wheel-work, which ftands in place of the ordinary motion-work, and partly for the fake of novelty, in the mode of reading the time indicated, the hours and minutes are both pointed to, at all times, by the fame hand; the minutes are indicated in the outer large circle of Arabic figures, and the hours in the inner one, or circle of Roman numerals, which, at firft fight, will appear a paradox, but when the reader is told that the inner circle moves as well as the common hand, the wonder will ceafe; their refpective velocities are 60 : 55; fo that fuppofing the point XII and the hand to ftart together from the point 60, in the fixed circle, when the hand has gone round, which it does in an hour, and indicates minutes on the fixed circle, the hour-plate has its point XII at 55, and its point I at 60, under the end of the hand; and at every fucceffive revolution of the hand, the hour-plate falls back the twelfth part of a circle, and in the fame proportion for any fmaller quantity, by which means both the hour and minute, at any period of the day, are both immediately under their common hand. At prefent the indication is half paft one o'clock, as feen in *fig.* 2; and puzzling as this mode may feem at firft, it is actually more fimple for a child to learn, than the ordinary mode by two hands, where one may be miftaken for the other; the only objection

objection is, that the hour cannot fo well be known at a diftance. The moveable plate being fmall, and equally poifed, by being circular, conftitutes no obftacle to free motion. The relative velocities are thus effected: the hand is carried by the arbor of the hour-wheel in the ufual way, and a tubed or cannon pinion, *a*, of 22 leaves, is put on tight, in the common manner, which gives its velocity to a pinion, *b*, of a fimilar number, and this pinion being made long and conical, turns on a ftud in the front of the frame, and actuates a third pinion of 24, concentric with the firft and covering it, round the tube of the little bridge that takes off the friction as ufual, fo that, as the velocities of the firft and third pinions are to each other inverfely as their refpective numbers of leaves, the revolving hand and hour-plate move with the velocities 24 and 22, that is, 60 and 55, as before ftated. In this mode of indicating time, three pinions without wheels are all that are neceffary for the motion-work, whereas three wheels and one pinion, or two wheels and two pinions, are ufually wanted to make the velocities of two hands 12 : 1.

But this fimple mode of indicating time has no connection with the other motions in the upper part of the dial-work, and the indication might be effected in the ordinary way without interfering with what follows, provided the ftriking work fhould be introduced and require it. It may be proper to obferve here, that the long fide pinion will act better when made not quite conical, but like two pinions, varying a little in diameter, placed clofe in contact. The fmall wheel *c* in *fig.* 1, revolves in feven days by means of its interior connection with the fufee-arbor, from which the moving power is taken, and is always detached, by pufhing in the key, during the act of winding, which is performed on the pofterior part; it is not neceffary to ftate more particularly how the multiplication from 12 hours to feven days arifes, as the operation is of the fimpleft nature; being only as 1 to 14; the arbor of this wheel *c*, which has 32 teeth, carries the fmall hand that points out the feven days of the week in one of the two correfponding fmall divided circles in *fig.* 2; by this wheel of 32 teeth is a large one of 135 driven, which is concentric with the lunar plate, that is carried round by its arbor in $\frac{135}{32}$ of 7 days, or in $29^{d}\ 12^{h}\ 45^{m}$. The arbor of this large wheel, as well as that of wheel 32, paffes through both plates of the clock frame, and is therefore fteady. On the plane of the moon's plate is painted a black fpiral on a white ground, tapering both ways from the middle in fuch a way, that the greateft breadth will juft cover the round hole made at the top of the dial, through which the moon's prefent afpect may always be feen, as it correfponds to her age. The arbor of the lunar wheel projects and receives three hands; that with a lune on it points out the moon's age in the outermoft circle of $29\frac{1}{2}$ fpaces of Arabic characters, and alfo the time of fouthing in the fecond circle of Roman numerals; the ftraight hand indicates the time of high water at each tide in the faid fecond circle, when fet for any particular place at new moon; and the third hand, that has a crofs near its extremity, fhews the day of the month in the outermoft circle, but requires adjuftment at the end of the month. To the lunar arbor is attached a pinion of 24 leaves, not feen, driving a wheel *d*, of 107 teeth round a ftud in the front plate, and another pinion of 31 leaves, faft to it, actuates a fecond wheel of 86 teeth round, in $\frac{107}{24}$ of $\frac{86}{31}$ of $29^{d}\ 12^{h}\ 45^{m}$, which period reduced is $365^{d}\ 6^{h}\ 1^{m}\ 5^{s}$, and a hand, inferted on its arbor, points out the month and fun's place in the fmall ecliptic, correfponding in fize to the week circle, in which the days are indicated. Upon the annual arbor of wheel 86 is alfo put a fmall circular plate divided into $29\frac{1}{2}$ fpaces, which fits into a round hole cut in the dial, the arbor being pivoted acrofs the frame, like the lunar and weekly arbors; the ufe of this fmall plate is to fhew the moon's place in the contiguous fmall ecliptic; for whatever be the moon's age indicated in its proper circle, the fame age looked to, in this little revolving circle of $29\frac{1}{2}$, will be oppofite the moon's mean place in the ecliptic at that time. Juft behind the fmall lunar plate which revolves in a year, and in the fame plane with the principal dial-plate, are fixed faft to the annual arbor two other wheels, one of 98 teeth, and the other of 55; the former clofe behind the dial, and the other contiguous to that; thefe drive each a correfponding wheel round the lunar arbor, confidered as a common ftem; the 98 drives a fellow of 93 teeth, and the 55 a fellow of 62; the former pair of wheels regulate the plate of the moon's nodes and latitude, marked on the plane of the wheel itfelf, which is not croffed, and the other pair carries a double hand, having A at one end, and P at the other, to fhew when the moon's hand comes in conjunction with the mean apogeal or perigeal point of her variable orbit. At the time the contriver of this clock adopted the numbers for the retrograde motion of the nodes, and progreffive motion of the apogee and perigee, he was not aware that they had been ufed in orreries, but he has fince found that the ratios he calculated for thefe purpofes have been chofen for the like ufes in fome other inftruments of illuftration. According to thefe numbers, the periods produced by the wheel-work are refpectively $18\frac{3}{5}$, and $8\frac{6}{7}$ civil years: and wherever the lunar hand is feen at any time, the latitude is indicated thereby on the innermoft circle, and the moon's pofition, with refpect to the apogee or perigee, may be feen, and confequently her apparent diameter and horizontal parallax, depending on her diftance from the earth, may be judged of at the time of infpection, and might even be indicated if another ftill fmaller plate were marked therewith, and fubftituted for the double hand. The pofitions of the refpective hands, and fmall plates, are for Monday July 4th, of the year 1808, when the moon's age is 12, her fituation at perigee, and alfo a little to the north fide of the afcending node, the fun's place, a little fhort of the middle of Cancer, and the moon's, a few degrees fhort of the end of Scorpio. In our article CHRONOMETER, we mentioned that the late Margetts contrived the dial-work of his chronometers fo ingenioufly, that both folar and fidereal time, in the three different denominations of hours, minutes, and feconds, are conftantly indicated at the fame time, and confequently, the fun's mean right afcenfion alfo, which is the difference between mean folar and fidereal time, at any given inftant; and as we promifed to defcribe the contrivance under the prefent head, we propofe to introduce it next.

Fig. 1. of *Plate* XXXIII. is a plan of the wheels and pinions employed in the motion-work, and *fig.* 2. is the reprefentation of the dials, of which there are four, one large and three fmall, and of the three hands; both figures being of the real fize. We will explain, *fig.* 1. firft; after premifing that we have inferted the letters of reference *a*, *b*, *c*, *d*, and *e*, on the margin of the face to avoid confufion, and have referred by dotted ftraight lines to the centres to which they refpectively belong, and where the reader is defired to conceive them placed: at the centre *a*, the hour-wheel or centre-wheel arbor projects, as ufual, from the frame of the chronometer, and takes the minutes-hand round the large circle, beyond the fmall face to the right in *fig.* 2, in a folar hour on a tube of fteel that fits tight by friction on the faid arbor, which tube is fquared as ufual to receive its hand; to the lower extremity of this tube, or cannon, as the workmen call it, are attached two cannon pinions, the inferior one of 80

leaves,

leaves, and the fuperior one of 15, both which confequently revolve together, in the fame period of one hour; the under pinion of 80, being of fmall diameter, has its teeth fo diminutive, that the naked eye can fcarcely perceive that there are any, and drives the large wheel of 487 teeth round the centre *c*, where a tube furrounds the folar feconds' hand, and forms a ftud for this wheel, in order that the arbor of the feconds' hand, projecting as ufual from the frame, may have no friction from contact, which it would have if the faid fixed tube were not interpofed; the period of this large wheel is $\frac{487}{80}$ of a folar hour, or $6^h\ 5^m\ 15^s$, and it carries round with it the loweft fmall face in *fig.* 2, in a direction contrary to that of the motion of the feconds' hand, which points to its divifions, and alfo to the fixed divifions of the circle furrounding this fmall face on the large dial itfelf. Again, the upper cannon pinion, of 15 leaves, actuates one of the two wheels of 75 teeth that revolve on the fufee's arbor, as on a ftud, at the point *d*, both of which wheels, being of the fame diameter and conftruction, and lying over one another, appear to an eye placed over them in the plan as one wheel; the wheel, however, in queftion, is the under one, to which a pinion of 15, not feen, is attached, that drives the under one of two fimilar wheels of 72 teeth each, round a ftud at the point *b*, in the period $\frac{75}{15} \times \frac{72}{15}$ of a folar hour, that is, in 24 hours of folar time; and upon a tube on this under wheel of 72 is the folar hour hand placed, that revolves in an exact folar day, and indicates the 24 hours of mean folar time on the large circle of Roman characters, that furrounds the left-hand fmall face. Thus, the three hands indicate the folar hours, minutes, and feconds on the three fixed circles of the large plate or dial. We have already feen, that the great wheel of 487 teeth revolves, by its connection with the cannon pinion, of 80, in $\frac{487}{80}$ of an hour, or in $6^h\ 5^m\ 15^s$, which period is exactly $365\frac{1}{4}$ minutes of folar time; to this wheel a pinion of 12 leaves is faft, that impels a wheel of 72 teeth round a ftud, or pin, on the cock *f*, that lies over a part of wheel 487, at the point *e*; this wheel has again a pinion faft to it of 8 leaves, that impels the wheel of 80 teeth round the cannon at *a*, in $\frac{72}{12} \times \frac{80}{8} = \frac{60}{1}$ of $365\frac{1}{4}$ minutes, which period is $15^d\ 5^h\ 15^m$, or $365\frac{1}{4}$ hours; and to the tube of this wheel of 80 the retrograde right-hand fmall plate, or dial, is attached by friction, and, confequently, revolves with it, as the fmall dial on the inferior part of the face does with the large wheel of 487, to which it is alfo attached by the friction of their tubes; and, laftly, a train of $\frac{75}{15} \times \frac{72}{15}$, in every refpect fimilar to the one of this denomination, already defcribed, converts the $365\frac{1}{4}$ hours into $365\frac{1}{4}$ days, for the period of the third, or left-hand fmall dial's retrograde revolution; that is, the pinion of 15, faft to the wheel of 80 teeth, drives the upper 75 round the point *d*, and its pinion of 15 again drives the upper 72 in the manner before defcribed, the train being, in both cafes, equal to $\frac{24}{1}$. Now, the manner in which fidereal time is indicated is, by means of the folar hands pointing to the three fmall dials that revolve in a retrograde direction, as they regard thefe bands, in $365\frac{1}{4}$ days, $365\frac{1}{4}$ hours, and $365\frac{1}{4}$ minutes refpectively; the fidereal hours, minutes, and feconds being fhorter in duration than folar ones, by fuch a minute quantity, as amounts, in the aggregate, to an entire fidereal day in a year, conftitute that fpecies of time which is ufed as the meafure of the right afcenfion of any of the heavenly bodies, and which is itfelf meafured by the earth's abfolute rotations on its axis, as they have a reference to a ftar, or any fixed point in the heavens; whereas, folar, or common time, is meafured by the faid rotations, as they refpect the fun, in apparent motion; which apparent motion is the confequence of the earth's annual progrefs in the ecliptic. The difference between a folar and fidereal day, in folar time, is fomewhat lefs than four minutes, or $3^m\ 56^s.55$, fo that a difference, or acceleration of fidereal, on folar time of one fecond, takes place in about fix minutes of folar time, namely, in $\frac{365^m.25638}{60} = 6^m.0876$; hence, fuppofing the figures of the fmall dials to be put, at any time, to coincide with the fame figures on the circles furrounding them on the fixed face, after about fix minutes, or entire revolutions of the folar feconds'-hand, the revolving feconds'-face or fmall dial, ought to fall back *one fecond fpace*, but the other two fmall dials will appear unaltered, by reafon of the flownefs of their motion; in the next fix minutes *two feconds* of difference will be indicated by the feconds'-hand, *i. e.* the folar feconds will be pointed to on the fixed face, and fidereal feconds on the moveable dial, which, therefore, we call the fidereal feconds'-dial, and the difference of the two indications will be two feconds; in like manner, after fixty fuch periods of fix minutes nearly, that is, after upwards of fix hours, one minute-fpace of difference will be indicated by the minutes'-hand, when the time, fhewn on the moveable dial, is compared with the time on the fixed circle of minutes, and the feconds'-hand will now, as at firft, indicate both folar and fidereal feconds alike, by reafon of the firft minute of difference being completed; and thus, in the courfe of the whole 24 folar hours, there will be a difference of nearly four minute fpaces fhewn by the minute hand; but as yet there is fcarcely any alteration perceptible in the hour-circles, nor will there be a difference of one hour's fpace till upwards of 15 days have tranfpired. Strictly fpeaking, the period in which the acceleration will amount to a fecond, by the wheel-work, will be $\frac{487}{80}$ of a minute, or 6.0875 minutes, and as the annual period of the retrograde motion of the fidereal hour-dial is $365^d\ 6^h\ 0^m$, inftead of $365^d\ 6^h\ 9^m\ 11^s.5$, the whole error in the indication of fidereal time, by the folar hands pointing to the fidereal, or moveable dials, will be little more than one fecond and a half in a fidereal year, which, it will be allowed, is hardly worth naming. The adjuftment of the dials is performed by the fun's mean right afcenfion, which is determined from the apparent right afcenfion, given for noon of each day, in the Nautical Almanac, and in White's Ephemeris, by applying the equation of time, together with the acceleration added thereto, at the rate of one fecond in each fix minutes of equation, to convert it into fidereal time; but care muft be taken to apply the equation with a contrary fign, to what is applied when apparent folar time is converted into mean. When the fun's mean right afcenfion is thus obtained in hours, minutes, and feconds, at the noon of any day, the hour on the fidereal hour-dial muft be put to coincide with XII on the folar dial, the minutes on the fidereal minute-dial muft be put to coincide with 60 on the folar minute-dial, and the feconds fo determined muft be put as counted on the fidereal feconds'-dial to 60 on the folar feconds'-plate, in which fituation of things, the chronometer will indicate not only folar and fidereal time, but alfo the fun's mean right afcenfion at mean noon, from which the ap-

 parent

parent right afcenfion may be obtained, by the application of the equation of time, increafed by the acceleration, with the fign fet down in the almanac. In *fig.* 2, the rectification of the dials and hands is for the 3d of Sept. 1808, when the folar time is noon or 24^h, the fidereal is $10^h\ 49^m\ 46^s$, the fun's mean right afcenfion alfo $10^h\ 49^m\ 46^s$, and the equation $-\ 50''$, which makes the apparent right afcenfion $10^h\ 48^m\ 56^s$, agreeably to the almanac.

From this view of the dial-work of Margett's chronometers, it is eafy to fee, that when the folar time is accurately indicated, the fidereal time correfponding muft neceffarily be indicated, accurately too, within a fecond in the firft eight months after rectification, and within two feconds for the next eight months, and fo on for any length of time; and when the time of rectification has been noted, the error may be applied, as a rate, if neceffary, at any fubfequent period, which confideration annihilates the objection to a want of complete accuracy. The motions produced by the wheels and pinions in this complex motion-work, being all very flow, deduct very little from the maintaining power, fo little, indeed, as to be abfolutely imperceptible in practice, particularly when a good detached efcapement is ufed. The ufe of fuch dial-work in a chronometer, that is regulated by a tranfit inftrument, muft be evident to every perfon fkilled in aftronomy, navigation, or that branch of furveying which has to do with long lines, the bearings of which are afcertained by the greateft elongations of the pole ftar. The fmall dials will tell, at all periods of day or night, throughout the year, what heavenly bodies, the right afcenfions of which are previoufly known, are on or near the meridian of the place for which the chronometer has its time adjufted.

We might enlarge this article by the addition of various other contrivances, introduced by ingenious workmen into the dial-work of clocks and watches, but we will fatisfy ourfelves with a defcription of a curious method of indicating time that has hardly yet gained a name, but which ranks among the other modes of pointing out time, though it has not yet been made public. A German mechanift happened to be at Copenhagen, felling a valuable clock which he had contrived and made, when the Englifh caufed that city to capitulate, and the artizan was brought over to England, where he remains in effect a prifoner; being thus feparated from his family, and having no means of fubfiftence but his fkill in mechanics, he invented the contrivance we are going to give a brief fketch of, and the plan of which is given in *fig.* 3, of *Plate* XXXIII. A B is a circle of brafs divided into twelve hours, and fub-divided into five minute fpaces, which circle is fupported, as feen in the figure, in a vertical pofition on a wooden bafe; C and D are two weights, apparently balanced on the oppofite ends of a bar, that turns on an axis, placed horizontally at right-angles, and fupported by a bearer in the fhape of a fifh refting on its head, the counterpoife C is ornamented with a ftar for the fake of a deception, that the mind may not be induced to fuppofe that any mechanifm is included. The curiofity, as well as utility of the contrivance, confift in this apparently felf-acting principle; move the bar, that now refts at $7^h\ 55^m$, forcibly round, fo as to give it confiderable velocity, and it will continue to fpin round for fome time, but whenever it comes to reft, it will come to a ftate of quiefcence, at any hour and minute of the day or night, with its index at the very point of the large divided circle that the prefent hour and minute require, though a fuperficial view of the thing will not difcover any caufe for fuch tendency to reft always at the prefent hour and minute, any more than the polarity of a magnetic needle can be difcovered by ocular examination. The fact, however, is, that a watch is contained in the box C, which makes a wheel revolve in twelve hours, that is loaded with a weight heavy enough to alter the common centre of gravity of the loads C and D, as the faid wheel revolves, thereby throwing the centre of gravity to the right and left of the axis of motion alternately, and caufing the ends of the bar, with its loads, to preponderate alternately, and, confequently, to revolve gradually from XII round to XII again, as the watch governs the rate. It will be feen, however, that the velocity of the bar will not be uniform in every part of its revolution, becaufe the cofines of the angles, denoted by equal times, do not vary by equal quantities, and the ingenious remedy for the natural inequalities of motion among the equally divided fpaces of the circle, conftitutes the fecret on which the accuracy of the thing, as a meafure of time, depends, when the watch is good, and which, therefore, we feel not at liberty to difclofe under the prefent circumftances of the manufacturer. We underftand, that their royal highneffes the dukes of York and Kent have purchafed each one of thefe horofcopes, as they may be not improperly called, as has alfo general Campbell; and Meffrs. Rundell and Co. of Ludgate-hill, have kindly undertaken to vend this ingenious article for the benefit of the inventor, who puts no higher price on it than about feven guineas.

DIALECT, Διαλεκτος, from Διαλεγεσθαι, *to difcourfe*, the peculiar language of fome province, or part, of a nation, formed by corruption of the general, or national language.

Homer could fpeak five different languages in one verfe, *i. e.* five dialects; *viz.* the Attic, Ionic, Æolic, the Doric, and the common dialect of the Greeks.

The Attic dialect is that which was ufed in Athens and the adjacent country; and it was more particularly ufed by Xenophon, Thucydides, Ariftophanes, Plato, Ifocrates, and Demofthenes. The Ionic was almoft the fame with the ancient Attic; but after it had paffed into feveral towns of Afia Minor, and into the adjacent iflands, which were colonies of the Athenians, and of the people of Achaia, it received a fort of new tincture, and did not attain to that perfect delicacy which the Athenians afterwards acquired. It was ufed by Herodotus and Hippocrates. The Doric was firft in ufe among the Spartans, and the people of Argos; it paffed afterwards into Epirus, Libya, Sicily, Rhodes, and Crete. Archimedes and Theocritus, both of them Syracufans, and Pindar, adopted this dialect. The Æolic dialect was at firft ufed by the Bœotians and their neighbours, and then in Æolis, a country of Afia Minor, between Ionia and Myfia, which contained 10 or 12 cities that were Grecian colonies. Sappho and Alcæus wrote in this dialect. We find alfo a mixture of it in the writings of Theocritus, Pindar, Homer, and many others.

The Bolognefe, Bergamafque, Tufcan, &c. are the dialects of the Italian; the Gafcon, and Picard, are dialects of the French.

In Great Britain, almoft every county has a dialect of its own, all differing confiderably in pronunciation, accent, and tone, though the language be the fame.

The method which the Gileadites took to prove the Ephraimites, by the pronunciation of *fhibboleth*, with *fchin*, or *famech*, is well known. Judges, xii. 6.

DIALECTICA, Dialectics, Διαλεκτικη, the art of reafoning and difputing juftly.

The word comes from the Greek διαλεγομαι, *I difcourfe*, formed of δια, and λεγω, *dico*, *I fay*.

Zeno Eleates is faid to have been the firft who difcovered the natural feries of principles and conclufions obferved in reafoning, and formed an art thereof, in form of a dialogue; which,

which, for this reafon, was called dialectica. Brucker (Hift. Philof. by Enfield, vol. i. p. 421.) fays, that the invention of the dialectic art has been improperly afcribed to Zeno; though there can be no doubt that this philofopher, and other metaphyfical difputants of the Eleatic fect, employed much ingenuity and fubtlety in exhibiting examples of moft of the logical arts, which were afterwards reduced to rule by Ariftotle and others.

The dialectica of the ancients is ufually divided into feveral kinds: the firft was the Eleatica, that of Zeno Eleates, which was threefold: *viz.* confecutionum, colloquationum, and contentionum. The firft confifting of rules for deducing, or drawing conclufions; the fecond, the art of dialogue; which became of fuch univerfal ufe in philofophy, that all reafoning was called interrogation; then fyllogifm being laid afide, the philofophers did all by a dialogue; it lying on the refpondent to conclude and argue from the feveral conceffions made. The laft part of Zeno's dialectics, ἐριστικὴ, was contentious; or the art of difputing, and contradicting: though fome, particularly Laertius, afcribe this part to Protagoras, a difciple of Zeno.

The fecond is the Dialectica Megarica, whofe author is Euclid, not the mathematician, but another, of Megara. He gave much into the method of Zeno, and Protagoras; though there are two things appropriated to him: the firft, that he impugned the demonftrations of others, not by affumptions, but conclufions; continually making illations, and proceeding from confequence to confequence; the fecond, that he fet afide all arguments drawn from comparifons, of fimilitude, as invalid.

He was fucceeded by Eubulides, from whom the fophiftic way of reafoning is faid to be derived. In his time the art is defcribed as manifold: mentiens, fallens, electra, obvelata, arcevalis, cornuta, and calva. See Sophism.

The third is the dialectics of Plato, which he propofes as a kind of analyfis, to direct the human mind by dividing, defining, and bringing things to the firft truth; where being arrived, and ftopping there a little, it applies itfelf to explain fenfible things; but with a view to return to the firft truth, where alone it can reft.

The fum of his doctrine on dialectics, as collected from his dialogues, is this: Truth is difcerned, not by the fenfes, but by the underftanding; the human intellect is employed, either upon things which it comprehends by itfelf, and which are in their nature fimple and invariable, or upon things which are fubject to the fenfes, and which are perpetually liable to fluctuation and change. The contemplation of the former creates fcience; attention to the latter produces opinion. Senfe is the paffive perception of the foul through the medium of the body. When the forms of things are, by means of the corporeal organs, fo deeply impreffed upon the mind, as not to be eafily effaced by time, this permanent impreffion is called Memory. From the union of fenfe and memory, or from the comparifon of a prefent with a recollected perception, arifes Opinion: when thefe agree, the opinion is true; when they differ, it is falfe. The feat of perception and memory is like a waxen tablet, or picture, which the mind contemplates, and thence frames opinions. In meditation, the foul converfes with itfelf: thought flows through the lips by means of the vocal organs. Intellection is the operation of the underftanding, contemplating intelligible forms, or ideas. It is twofold; the firft, that of the foul contemplating ideas before it defcends into the body: the other, that which it exercifes after it is immerfed in the body, which may be alfo termed natural knowledge. This kind of knowledge confifts in the recollection of thofe things which the mind had known in its pre-exiftent ftate, and differs from memory in the object; memory being employed upon fenfible things, reminifcence upon things purely intelligible. The intelligible objects of contemplation are either primary or fecondary: the primary are ideas; the fecondary are the forms infeparable from material objects. The mind, in exercifing its judgment, confiders theoretically what is true or falfe, and practically what may, or may not be done. Dialectics confider the effence and the accidents of things; concerning the former, as we have already obferved, it makes ufe of divifion, definition, and analyfis. Divifion feparates the genus into its fpecies, the whole into its parts, and the like. Definition expreffes the genus, or the thing to be defined, and diftinguifhes it from all others by adding its fpecific difference. Analyfis rifes from objects of fenfe to intelligibles; from demonftrable propofitions to axioms, or from hypothefis to experience. Induction rifes from individuals to univerfals. Syllogifm produces a conclufion by means of fome intermediate propofition. Thefe topics are curforily touched upon by Plato; and it is rather by examples, than by precepts, that he teaches the true art of reafoning, or expofes the fallacies of fophiftry.

The fourth is Ariftotle's dialectics, containing the doctrine of fimple words, delivered in his book of "Predicaments:" the doctrine of propofitions, in his book "De Interpretatione;" and that of the feveral kinds of fyllogifm, in his books of "Analytics," "Topics," and "Elenchufes." See Aristotle and Logic.

The fifth is the dialectics of the Stoics, which they call a part of philofophy, and divide into rhetoric, and dialectic; to which fome add the definitive, whereby things are juftly defined, comprehending, likewife, the canons, or criterions, of truth. See Logic.

The Stoics, before they come to treat of fyllogifms, have two principal places; the one about the fignification of words; the other, about the thing fignified. On occafion of the firft, they confider abundance of things belonging to the grammarian's province: what, and how many letters; what is a word, diction, fpeech, &c. On occafion of the latter, they confider things themfelves, not as without the mind, but as in it, received in it by means of the fenfes. Accordingly, they firft teach, that "nil fit intellectu, quod non prius fuerit in fenfu;" whatever is in the mind, came thither by the fenfes; and that, "aut incurfione fui," as Plato, who meets the fight; "aut fimilitudine," as Cæfar by his effigy; "aut proportione," either by enlarging, as a giant, or by diminifhing, as a pigmy; "aut tranflatione," as a Cyclops; "aut compofitione," as a Centaur; "aut contrario," as death; "aut privatione," as a blind man.

Concerning the whole bufinefs of dialectics, as it appears to have been conducted by the Stoics, we may exclaim with Seneca: "O pueriles ineptias! in hoc, fupercilia fubduximus? in hoc, barbara demiffimus? hoc eft, quod triftes docemus, et pallidi?"

The fixth is Epicurus's dialectics. For though he feems to have defpifed dialectic, he cultivated it with vigour: he was only averfe to that of the Stoics, who he thought attributed too much to it; as pronouncing him alone wife, who was well verfed in dialectics. For this reafon, Epicurus feeming to fet afide the common dialectics, as only productive of thorny difputes, idle quibbles, and fruitlefs cavilling, had recourfe to another way; *viz.* to certain canons, which he fubftituted in their ftead, the collection whereof he called canonica; and as all queftions in philofophy are either *de re*, or *de voce*, he gave feparate rules for each. See Epicureans.

The dialectic philofophy, loaded with metaphyfical fubtleties, which had been ftudied and profeffed by feveral of the clergy towards the clofe of the 11th century, began, at the opening

opening of the 12th, to be publicly taught in the schools, and to take the lead of every other kind of learning.

Abelard devoted himself to this kind of study at the commencement of his literary career, and in the review of this part of his course, he observes, that philosophy was thus wasting its strength upon trifles, and that, at this time, it was, perhaps, more than ever, the employment of the philosophical world to dispute *de lana caprina*. Dialectic philosophy was now in high esteem, from a notion, that it was the key of theology, without which it would be impossible to unlock the mysteries of sacred wisdom. It was on account of this supposed alliance between logic and theology, that the former was made the principal object of study in all the schools, and that those who excelled in the dialectic art were regarded with the highest admiration, and attended by crowds of pupils. Besides, the logical and metaphysical writings of Aristotle were studied in the Saracen schools in Spain, and industriously dispersed through France, Germany, and Italy. It was also about this time that many Greek copies of the works of Aristotle were brought from Constantinople into the west. By degrees the fondness for the subtleties of Aristotelian logic and metaphysics became so general, that the orthodox clergy complained, that scholars spent their whole time in disputation. Their complaints and their prohibitions were, however, ineffectual; and at length it was found necessary, under certain restrictions, to favour the study of Aristotle. In process of time, and by no very slow gradation, the Aristotelian dialectics became intimately connected with theology, and on this account obtained the zealous patronage of those who presided in the church; so that almost the whole Christian church became scholastics. (See SCHOLASTICS.)

At length, about the time of the reformation, many learned men, particularly Valla, Agricola, and Vives, spoke with great freedom of the defects of the Aristotelian logic; but no one attempted to introduce a better in the room of it, till Peter Ramus undertook the task, and executed it with a degree of courage and success, which has justly given his name considerable celebrity. (See RAMUS.) The fame of Ramus, however, vanished before that of Des Cartes; and the ultimate demolition of the Aristotelian philosophy, as it respects the subject of this article, was principally owing to the labours of the celebrated Mr. Locke, and to the essay on the Human Understanding. See LOGIC.

DIALECTICAL ARGUMENTS, in *Logic*, are such as are only probable, and do not convince, or determine, the mind absolutely to either side of the question.

DIALIA, in *Antiquity*, sacrifices performed by the flamen dialis, or priest of Jupiter.

It was not, however, of such absolute necessity, that the Dialia should be performed by the flamen dialis; but that others might officiate. We find in Tacitus, Annal. lib. ii. cap. 58. that if he were sick, or detained by any other public employ, the pontifices took his place.

DIALIS, a Latin term, signifying somewhat that belongs to Jupiter.

The word is formed from Διος, the genitive of Ζευς, *Jupiter*.

DIALIS, *Flamen*. See FLAMEN.

DIALISIS. See DIALYSIS.

DIALITHA, from δια, and λιθος, *gem*, in the *Writings of the Ancients*, a word used to express the elegant ornaments of the Greeks and Romans, composed of gold and gems. They also called these lithocolla, cemented stones or gems, the gold being in this case, as a cement, to hold the stones together. They wore bracelets, and other ornamental things about their habits, thus made; and their cups and table-furniture for magnificent treats were of this kind. The green stones were found to succeed best of all in these things; and the emerald and greenish topaz, or, as we call it, chrysolite, are most in esteem for this purpose. This use of the stone explains what Pliny very often says of them in his description: "Nihil jucundius aurum decet: nothing becomes gold better." This he says of the green topaz or chrysolite; and this, and many other like passages, have greatly perplexed the critics who did not hit upon this explication. The Latins called these dialitha, lithocolla, and aurum gemmatum; and thus Martial, where he says "miratur Scythicas virentis auri flammas Jupiter," alludes to cups of gold, ornamented with Scythian gems, that is, emeralds.

DIALIUM, in *Botany*, Linn. Mant. 3. Schreb. 14. Willd. Sp. Pl. v. 1. 49. Vahl. Enum. v. 1. 303. Juss. 424. Afzel. Gen. Pl. Guin. p. 1. 13. (Aruna; Schreb. 26. Willd. Sp. Pl. v. 1. 156. Arouna; Aubl. Guian. v. 1. 16. Juss. 366.) Class and order, *Diandria Monogynia*. Nat. Ord. *Lomentaceæ*, Linn. *Leguminosæ*, Juss. The origin of the name we have not been able to discover.

Gen. Ch. reformed. *Cal.* Perianth irregular; in five deep segments, equal in length, ovate, obtuse, concave. *Cor.* none. *Stam.* Filaments two, awl-shaped, situated at the upper side of the receptacle; anthers not extending beyond the calyx-leaves, oblong, obtuse, heart-shaped at the base, of two lobes and two cells. *Pist.* Germen superior, nearly sessile, ovate, oblique, downy; style awl-shaped, the length of the stamens, smooth at the summit, and somewhat recurved; stigma simple, obtuse. *Peric.* Legume, internally pulpy, with one or two compressed seeds.

Eff. Ch. Calyx in five deep segments. Corolla none. Stamens at the upper side of the flower. Legume nearly sessile, pulpy within.

1. D. *indum*. Linn. Mant. 24. Willd. Sp. Pl. v. 1. 49. Vahl. Enum. v. 1. 303. (D. javanicum; Burm. Ind. 12.) Leaflets smooth on both sides, elliptic-oblong. Anthers thrice as long as the filaments.——A native of Java, where it is called, in the Malay language, *Coerandie*. It is a tree, with alternate pinnated leaves; leaflets seven, alternate, on short thick round smooth partial stalks, elliptic-oblong, inclining to ovate, pointed, entire, veiny, smooth on both sides, except a blistery appearance underneath. Panicles clustered, axillary and terminal; their branches downy, alternate, compound and racemose, some of the lower ones rather corymbose. Flowers drooping, reddish, the size of *Clethra alnifolia*, externally downy. Segments of the calyx elliptical, obtuse, concave, three of them external. Filaments very short and thick. Anthers large, full thrice as long, with a deep furrow on each side between their lobes, and a slighter one along their edges. Germen sessile, ovate, pointed, oblique, silky, with a gland at its base. Style awl-shaped, recurved and smooth at the summit. Ripe fruit unknown.

Concerning this plant there has been much uncertainty. Our description is taken from the original specimen in the Linnæan Herbarium, which Dr. Afzelius also investigated. See his Dissertation above quoted. His object was to distinguish it generically from his *Codarium*, presumed to be the *Dialium guineense* of Willdenow. (See CODARIUM.) In doing this, Dr. Afzelius justly terms calyx what Linnæus calls corolla. It is singular that Vahl should not have made his own elaborate descriptions of these two genera accord in this particular. The fruit of the *Codarium acutifolium* of Afzelius, (*C. nitidum* of Vahl.) is called at Sierra Leone the Velvet Tamarind, its pulp being agreeably acid and nutritious. Another species, found in the country vulgarly called Cape Coast, is termed by Afzelius *C. obtusifolium*; "Leaflets equal in size, rounded at their points."

2. D. *divaricatum*. Vahl. Enum. v. 1. 303. (Arouna guianensis; Aubl. Guian. v. 1. 16. t. 5. Aruna divaricata; Willd. Sp. Pl. v. 1. 156.) Leaflets downy beneath, ovate, oblique

oblique at the base. Anthers roundish, scarcely so long as the filaments.—Gathered by Aublet, (one of whose own specimens is now before us) in the great forests of Guiana, towards the river Sinemari. This is a tree 30 or 40 feet high, flowering in November, and bearing fruit in March. Branches round, tuberculated, leafy. Leaves alternate, three or four inches long, pinnate; leaflets usually five or seven, alternate, on short thick round downy partial stalks, ovate, pointed, entire, veiny, oblique or sloped off at their base; smooth or nearly so above, finely downy and ferruginous beneath, especially their ribs and veins. The partial stipulas, described and figured by Aublet, are declared by Vahl not to exist, nor do we find them in our specimen. Panicles much smaller than in the first species, and rather more divaricated, clothed with rusty down, their branches corymbose. Unexpanded flowers the size of mustard seed, ovate, short and thick, rusty. Calyx at length reflexed, apparently permanent. Stamens somewhat distant. Anthers short, heart-shaped. Germen silky, nearly sessile in the disk of an annular receptacle, without any peculiar gland. Style twisted. Fruit, according to Aublet, an oval, slightly compressed, capsule, or rather pod, containing one or two seeds lodged in reddish acid pulp. One of the seeds is often abortive.

We venture to follow Vahl in uniting these two plants under one genus, notwithstanding the fruit of the former being unknown, and some slight discrepancy in the position or situation of their stamens. In habit they are sufficiently a-kin. Can the apparent gland, hitherto unnoticed, which we have found in *D. indum* be the rudiment of a petal? If so, it brings this species very near to *Codarium*. S.

DIALLACTERII, among the Athenians. See DIÆTETÆ.

DIALLELOS, Διαλληλος, in *Rhetoric*, a figure, wherein the words and meaning of a sentence are inverted, as doctis disertior, disertis doctior. Voss. Rhet. lib. v. p. 405.

DIALLING, the art of drawing sun, moon, and star-dials, on any given plane, or on the surface of any given body. See DIAL.

The Greeks and Latins call this art gnomonica, and sciatherica, because it distinguishes the hours by the shadow of a gnomon. Some call it photo-sciatherica, because the hours are sometimes shewn by the light of the sun. Lastly, others call it horologiography.

Dialling is wholly founded on the first motion of the heavenly bodies, and chiefly the sun; or rather on the diurnal rotation of the earth; so that the elements of spherics, and the spherical astronomy, should be mastered, before a person advances to the doctrine of dialling: the doctrine, or theory, we say, for as to the practice, or the operations themselves distinct from the demonstrations, nothing is more easy and obvious.

The principles of dialling may be easily deduced from the method, already illustrated, of constructing dials by the globe. Or, they may be farther explained, by supposing the whole earth P c p (*Plate* IV. *fig.* 36.) to be transparent and hollow, like a sphere of glass, and its equator to be divided into twenty-four equal parts by so many meridian semicircles a, b, c, d, e, f, g, &c. one of which is the geographical meridian of any given place, as London, which is supposed to be at the point a; and if the hour of XII were marked at the equator, both upon that meridian and the opposite one, and all the rest of the hours in order on the other meridians, those meridians would be the hour-circles of London: because, as the sun appears to move round the earth, which is in the centre of the visible heavens, in twenty-four hours, he will pass from one meridian to another in an hour. Then, if the sphere had an opake axis, as P E p, terminating in the poles P and p, the shadow of the axis, which is in the same plane with the sun, and with each meridian, would fall upon every particular meridian and hour, when the sun came to the plane of the opposite meridian, and would consequently shew the time at London, and at all other places on the same meridian. If this sphere was cut through the middle by a solid plane A B C D in the rational horizon of London, one half of the axis E P would be above the plane, and the other half below it; and if straight lines were drawn from the centre of the plane to those points where its circumference is cut by the hour-circles of the sphere, those lines would be the hour-lines of the horizontal dial for London; for the shadow of the axis would fall on each particular hour-line of the dial, when it fell upon the like hour-circle of the sphere. If the plane which cuts the sphere be upright as A F C G (*fig.* 37.) touching the given place, *e. g.* London, at F, and directly facing the meridian of London, it will then become the plane of an erect direct south dial; and if right lines be drawn from its centre E, to those points of its circumference where the hour circles of the sphere cut it, these will be the hour-lines of a vertical or direct south dial for London, to which the hours are to be set in the figure, contrary to those on a horizontal dial; and the lower half E p of the axis will cast a shadow on the hour of the day in this dial, at the same time that it would fall upon the like hour-circle of the sphere, if the dial plane was not in the way. If the plane, still facing the meridian, be made to incline, or recline, any given number of degrees, the hour-circles of the sphere will still cut the edges of the plane in those points to which the hour-lines must be drawn straight from the centre; and the axis of the sphere will cast a shadow on these lines at the respective hours. The like will still hold, if the plane be made to decline by any given number of degrees from the meridian towards the east or west; provided the declination be less than 90 degrees, or the reclination be less than the co-latitude of the place; and the axis of the sphere will be the gnomon; otherwise, the axis will have no elevation above the plane or the dial, and cannot be a gnomon.

Thus it appears, that the plane of every dial represents the plane of some great circle on the earth, and the gnomon the earth's axis; the vertex of a right gnomon the centre of the earth or visible heavens; and the plane of the dial is just as far from this centre as from the vertex of this style. The earth itself, compared with its distance from the sun, is considered as a point; and therefore, if a small sphere of glass be placed upon any part of the earth's surface, so that its axis be parallel to the axis of the earth, and the sphere hath such lines upon it, and such planes within it, as above described, it will shew the hours of the day as truly as if it were placed at the earth's centre, and the shell of the earth were as transparent as glass. Ferguson, ubi supra. See GNOMONIC *Projection*.

The principal writers on dialling are, Vitruvius, Sebastian Munster, John Dryander, Conrade Gesner, Andrew Schoner, Fred. Commandine, Joan. Bapt. Benedictus, J. G. Schomberg, Solomon de Caus, J. B. Trolta, Desargues, Kircher, Hallum, J. Mark, and Clavius, who demonstrates all, both the theory and the operations, after the rigid manner of the ancient mathematicians; but so intricately, that probably few ever read them: Dechales, Ozanam, and Schottus, give much easier in their Courses, and Wolfius in his Elements.

M. Picard has given a new method of making large dials by calculating the hour-lines; and M. de la Hire, in his Dialling, printed in 1683, a geometrical method of drawing hour-lines from certain points, determined by observation. Eberhardus Walperus, in 1625, published his Dialling, wherein

wherein he lays down a method of drawing the primary dials on a very eafy foundation. The fame foundation is defcribed at length by Sebaftian Munfter, in his Rudimenta Mathematica, publifhed in 1651. Sturmius, in 1672, publifhed a new edition of Walperus's Dialling, with the addition of a whole fecond part, about inclining and declining dials, &c. In 1708, the fame work, with Sturmius's additions, was republifhed with the addition of a fourth part, containing Picard's and De la Hire's methods of drawing large dials, which makes much the beft, and fulleft book on the fubject. Peterfon, Michael, and Muller, have each written on dialling, in the German tongue; Coetfius, in his Horologiographia Plana, printed in 1689; Gauppenius, in his Gnomonica Mechanica; Leybourn, in his Dialling, fol.; Bion, in his Ufe of Mathematical Inftruments; and Wells, in his Art of Shadows. We have a treatife by M. Deparcieux, in 1740. Mr. Fergufon has alfo written on this fubject in his Lectures on Mechanics: Mr. Emerfon, in the 9th volume of his works; and Mr. W. Jones, in his Inftrumental Dialling.

Dialling *Cylinder*, *Univerfal*, is reprefented by *fig.* 38. A B C D is a glafs cylindrical tube, clofed at both ends with brafs plates, in the centres of which a wire or axis E F G is fixed. The tube is either fixed to an horizontal board H, fo that its axis may make an angle with the board equal to that which the earth's axis makes with the horizon of any given place, and be parallel to the axis of the world; or it may be made to move on a joint, and elevated for any particular latitude. The twenty-four hour-lines are drawn with a diamond on the outfide of the glafs, equidiftant from each other, and parallel to the axis. The XII next B ftands for midnight, and the XII next the board H for noon. When the axis of this inftrument is elevated according to the latitude, and the board fet level with the line H N in the plane of the meridian, and the end N towards the north, the axis E F G will ferve as a gnomon or ftyle, and caft a fhadow on the hour of the day among the parallel hour-lines, when the fun fhines on the inftrument. As the plate A D at the top is parallel to the equator, and the axis E F G perpendicular to it, right lines drawn from the centre to the extremes of the parallels will be the hour-lines of an equinoctial dial, and the axis will be the ftyle. An horizontal plate *e f* put down into the tube, with lines drawn from the centre to the feveral parallels cutting its edge, will be an horizontal dial for the given latitude; and a vertical plate *g c*, fronting the meridian and touching the tube with its edge, with lines drawn from its centre to the parallels, will be a vertical fouth dial: the axis of the inftrument ferving in both cafes for the ftyle of the dial; and if a plate be placed within the tube, fo as to decline, incline, or recline, by any given number of degrees, and lines being drawn, as above, a declining, inclining, or reclining dial will be formed for the given latitude. If the axis with the feveral plates fixed to it be drawn out of the tube, and fet up in funfhine in the fame pofition they were in the tube, A D will be an equinoctial dial, *e f* an horizontal dial, and *g c* a vertical fouth dial, and the time of the day will be fhewn by the axis E F G. If the cylinder were wood, inftead of glafs, and the parallel lines drawn upon it in the fame manner, it would ferve to facilitate the operation of making thefe feveral dials. The upper plate with lines drawn to the feveral interfections of the parallels, which appears obliquely in *fig.* 38, would be an equinoctial dial, as in *fig.* 39, and the axis perpendicular to it be its ftyle. An horizontal dial for the latitude of the elevation of the axis might be made, by drawing out the axis and cutting the cylinder, as at *e f g h*, parallel to the horizontal board H; the fection would be elliptic, as in *fig.* 40. A circle might be defcribed on the centre, and lines drawn to the divifions of the ellipfe would be the hour-lines; and the wire put in its place again, as E, would be the ftyle. If this cylinder were cut by a plane perpendicular to the horizontal board H, or to the line S H N, beginning at *g*, the plane of the fection would be elliptic, as in *fig.* 41, and lines drawn to the points of interfection of the parallels on its edge would be the hour-lines of a vertical direct fouth dial, which might be made of any fhape, either circular or fquare; and F the axis of the cylinder would be its ftyle. Thus alfo inclining, declining, or reclining dials might be eafily conftructed, for any given latitude. Fergufon, ubi fupra.

Dialling *Globe*, is an inftrument made of brafs, or wood, with a plane fitted to the horizon, and an index; particularly contrived to draw all forts of dials, and to give a clear exhibition of the principles of that art.

Dialling *Lines*, or *Scales*, are graduated lines, placed on rules, or the edges of quadrants, and other inftruments, to expedite the conftruction of dials.

The principal of thefe lines are, 1. A fcale of fix hours, which is only a double tangent, or two lines of tangents, each of 45 degrees, joined together in the middle, and equal to the whole line of fines, with the declination fet againft the meridian altitudes in the latitude of London, fuppofe, or any place for which it is made: the radius of which line of fines is equal to the dialling fcale of fix hours. 2. A line of latitudes, which is fitted to the hour-fcale, and is made by this canon: as the radius is to the chord of 90 degrees; fo are the tangents of each refpective degree of the line of latitudes to the tangents of other arches: and then the natural fines of thofe arches are the numbers, which, taken from a diagonal fcale of equal parts, will graduate the divifions of the line of latitude to any radius. The line of hours and latitudes is generally for pricking down all dials with centres. For the method of conftructing thefe fcales, fee Scale. There are feveral other lines put upon fcales for dialling, adapted to particular latitudes. Such are, 1. A line of chords: 2. A line of the fubftyle's diftance from the meridian: 3. A line for the height of the ftyle above the place: 4. A line of the angle of the hours of 12 and 6: 5. A line of the plane's difference of longitude, or inclination of meridians. All thefe are calculated for every degree of declination, for fome particular latitude, *e. g.* that of London, by the following problem. Let the latitude of the place and the declination of the plane be given; and let it be propofed to find the height of the pole above the dial-plane, the diftance of the fubftyle from 12 o'clock, and the plane's difference of longitude. Let N E S W (*fig.* 42.) be the horizon, C its centre, N S the meridian, P the pole, and Z the zenith; H A the declining vertical plane; P 1, P 2, P 3, &c. meridians or femi circles, interfecting the circle H A in *t*, *v*, &c. Let the meridian P *v* 2 be perpendicular to H A, then the plane of the meridian P *v* 2 will be perpendicular to the plane of the dial; and therefore the angle Z P *v* is the plane's difference of longitude, or the angle on the fphere contained between the meridian of the place and the meridian of the plane, called alfo the "inclination of meridians," and the arc P *v* is the height of the pole above the plane; and the arc Z *v* is the diftance of the fubftyle from the meridian. Therefore in the right-angled fpherical triangle P Z *v* all the three requifites will be found. For we have P Z the complement of the latitude, and the angle P Z A the complement of the declination A E; whence will be found P *v*, Z *v*, and the angle Z P *v*. Thus 1. As radius is to the fine of declination, fo is the cotangent of latitude to the tangent of the fubftyle's diftance from 12 o'clock; for by a cafe of right-angled fpherical triangles, rad. : cof. P Z *v* :: tang. P Z : tang. Z *v*. 2. Radius is to the cofine of declination as the cofine of latitude is

to

to the ſine of the ſtyle's height; for by right-angled ſpherical triangles, rad. : S . PZ : : S . PZv : S . Pv. 3. Sine of latitude is to radius as the tangent of declination is to the tangent of the plane's difference of longitude; for, rad. : coſ. PZ : : tang. PZv : cotang. ZPv : : tang. Z Pv. cotang. PZv. 4. For the hour angles, it will be, as radius is to the ſine of the pole's height, ſo is the tangent of the hour-arc from the meridian of the plane to the tangent of the hour angle from the ſubſtyle. For let Pt I be any hour-circle; and in the triangle Ptv, we have the pole's height Pv, and the hour-arc, equal to the angle tPv; and therefore to find tv, ſay, rad. : S . Pv : : tang. tPv : tang. tv = the angle at the centre, or hour-angle. That theſe ſeveral concluſions are rightly deduced will appear thus. The planes of the two meridians PZ, Pv, interſect one another on the ſphere in an angle ZPv, equal to the plane's difference of longitude. And the ſame meridians interſect the plane of the dial in an angle equal to Z V, as it ſhould be. For they interſect one another in the centre of the ſphere, which is the centre of the dial. And they interſect the dial-plane H A in Z and v, and Zv meaſures that angle at the centre. For the ſame reaſon, tv meaſures the hour-angle from the ſubſtyle. Again, Pv meaſures the angle of the ſtyle above the ſubſtyle. For Pv is perpendicular to H A, and the arc Pv meaſures the angle formed at the centre of the ſphere, which is the centre of the dial; one ſide being the axis drawn from P, the other the ſubſtyle drawn from V. Moreover, ZPv has been ſhewn to be the plane's difference of longitude. It appears farther, that the plane's differencce of longitude on the ſphere is converted into the ſubſtyle's diſtance from 12, by the interſection of the two meridians (of the place and of the plane) with the dial-plane: For the angle ZPv expreſſes the one, and the arc Zv the other. Again, every hour-angle on the ſphere is converted into the hour-angle in the dial, by the interſection of the ſame two hour-circles, with the plane of the dial; for the angle tPv expreſſes the hour-angle on the ſphere, and tp the angle at the centre. Similar reſults may be obtained from other data by different proportions. Thus, 1. For finding the ſubſtyle's diſtance: coſ. of pole's height above the plane Pv : S. lat. or coſ. PZ : : radius : coſ. of the diſtance of the ſubſtyle from 12. Or, radius : S. declination or coſ. PZv : : tang. of the pole's height above the plane Pv : S. of the ſubſtyle's diſtance Zv. 2. For finding the ſtyle's height: coſ. of ſubſtyle's diſtance, Zv : S. lat. or coſ. PZ : : radius : coſ. ſtyle's height Pv : or, rad. : S. ſubſtyle's diſtance, Zv : : cotang. declination, or tang. PZv : tang. of ſtyle's height, Pv. 3. For the plane's difference of longitude; coſ. lat. or S. PZ : rad. : : S. ſubſtyle's diſtance, Zv : S. plane's difference of longitude, ZPv. Or, rad. : tang. lat. or cotang. PZ : : tang. ſtyle's height, Pv : coſ. of plane's difference of longitude, ZPv. Or, rad. : coſ. declination, S . PZv : : coſ. ſubſtyle's diſtance Zv : coſ. of plane's difference of longitude, ZPv. Or, coſ. ſtyle's height, Pv : S. declination, or coſ. PZv : : rad. : S. of plane's diff. of longitude, ZPv. Or, S. of ſtyle's height Pv : rad. : : tang. of ſubſtyle's diſtance, Zv : tang. of plane's diff. of longitude, ZPv. On a ſcale the ſeveral requiſites for any declining dial are had by inſpection. In uſing it, count the plane's declination on the line of chords, and a line drawn directly acroſs, will interſect all the other lines in their proper points; which the numbers of graduation will indicate, and theſe give all the requiſites without calculation.

When a ſcale of this ſort is not to be had, the requiſites may be found by Gunter's ſcale, extending upon the ſeveral lines, according to the rules and proportions laid down for that purpoſe.

Dialling *Sphere*, is an inſtrument made of braſs, with ſeveral ſemi-circles ſliding over one another, on a moving horizon, to demonſtrate the nature of the doctrine of ſpherical triangles, and to give a true idea of the drawing of dials on all manner of planes.

Dialling, in a *Mine*, called alſo *Plumbing*, is the uſing of a compaſs (which they call dial), and a long line, to know which way the load, or vein of ore inclines, or where to ſhift an air-ſhaft, or bring an adit to a deſired place. See Mining, *art of*, and Plumbing.

In the ancient books of the Derbyſhire mining laws, directions are given for the practice of dialling, wherein a dial is deſcribed, whoſe circle is divided into 32 points each $= 11\frac{1^{\circ}}{4}$, and each of theſe into 4 pricks, each $= 2\frac{13^{\circ}}{16}$. Cary, in the Strand, manufactures dials, or ſquare compaſs boxes, with a ſmall reflector in the lid that turns on an hinge; by means of which, and a pin ſtanding up on the oppoſite ſide of the box, obſervations can be made either to a candle under-ground, or to an object above-ground, and its azimuth conveniently and accurately aſcertained.

DIALOGISM, Διαλογισμος, in *Rhetoric*, is uſed for the ſoliloquy of perſons deliberating with themſelves. We have an inſtance of it in Virgil, where Dido ſays,

> "En quid agam? rurſuſne procos irriſa priores
> Experiar? &c."

In which ſenſe, it is diſtinguiſhed from dialogue. Voſſ. Rhet. lib. v. p. 355. See Dialogue.

Dialogism is alſo taken in a more extenſive ſenſe for diſcourſe in general, whether held by a perſon alone or in company.

DIALOGUE, a converſation of two or more perſons, real or feigned, either by word or mouth, or in writing. The word is formed from the Latin *dialogus*, of the Greek διαλογος, which ſignifies the ſame.

Dialogue is greatly recommended by many authors, and is the moſt ancient form of writing, and that wherein the firſt authors wrote moſt of their pieces. The archbiſhop of Cambray gives a fine account of the advantages of dialogue, at the head of his paſtoral inſtruction. The ſacred writers, and the fathers, Athanaſius, Baſil, Chryſoſtom, &c. have uſed this mode of inſtruction.

Antiquity made uſe of dialogue, not only on humorous and comical ſubjects, as Lucian did, but alſo on the moſt ſerious and abſtract: ſuch are the dialogues of Plato, and thoſe of Cicero, which turn altogether on ſubjects of philoſophy or politics.

Plato is eminently diſtinguiſhed for the beauty of his dialogues. The ſcenery, and the circumſtances of many of them, are admirably painted. The characters of the ſophiſts, with whom Socrates diſputed, are well drawn: a variety of perſonages is exhibited: we are introduced into a real converſation, often ſupported with much life and ſpirit, after the Socratic manner. For richneſs and beauty of imagination, no philoſophical writer, ancient or modern, is comparable to Plato; the only fault of his imagination is ſuch an exceſs of fertility as allows it ſometimes to obſcure his judgment. It frequently carries him into allegory, fiction, enthuſiaſm, and the airy regions of myſtical theology. The philoſopher is, occaſionally, loſt in the poet. He affords, however, much edification; but whether we be edified with the matter or not, we are always entertained with the manner, and left under a ſtrong impreſſion of the ſublimity of the author's genius.

Cicero's dialogues, or thoſe recitals of converſation which he has introduced into ſeveral of his philoſophical and critical works, are not ſo ſpirited, nor ſo characteriſtical as thoſe of

Plato. Yet fome, as that "De Oratore" efpecially, are agreeable and well fupported. They fhew us converfation carried on among fome of the principal perfons of ancient Rome, with freedom, good breeding, and dignity. The author of the elegant dialogue "De caufis corruptæ Eloquentiæ," which is fometimes annexed to the works of Quintilian, and fometimes to thofe of Tacitus, has happily imitated, or perhaps excelled Cicero, in this manner of writing.

Lucian has given us a model of the light and humorous dialogue, which he has carried to great perfection. A character of levity, and at the fame time of wit and penetration, diftinguifhes all his writings. His great object was to expofe the follies of fuperftition, and the pedantry of philofophy, which prevailed in his age; and he could not have taken any more fuccefsful method for this purpofe, than that which he has employed in his dialogues, efpecially in thofe of the gods and of the dead, which abound with pleafantry and fatire. In this invention of dialogues of the dead, he has been followed by feveral modern authors.

Among the moderns, the principal dialogifts are M. de Fenelon, archbifhop of Cambray; M. Pafchal, in his Provincial Letters; F. Bouhours, in his Entretiens d'Arifte, & d'Eugene; M. Fontenelle, in his Dialogues of the Dead, and Plurality of Worlds; Addifon, Hurd, lord Lyttelton, &c.

Fontenelle's dialogues are fprightly and agreeable; but his characters are all French, whoever are his perfonages: fo difficult is it to exhibit characters properly diftinguifhed. Hence few authors are eminent for characteriftical dialogue on grave fubjects. One of the moft remarkable in the Englifh language is

Dr. Henry More, in his Divine Dialogues, relating to the foundations of natural religion. Although his ftyle be now in fome meafure obfolete, and his fpeakers be marked with the academic ftiffnefs of the times in which he lived, yet the dialogue is animated by a variety of character, and a fprightlinefs of converfation, beyond what are commonly met with in writings of this kind.

Bifhop Berkeley's dialogues, concerning the exiftence of matter, do not attempt any difplay of characters; but they furnifh an inftance of a very abftract fubject, rendered clear and intelligible by means of converfation properly managed.

Dialogue writing may be executed, either as direct converfation, where none but the fpeakers appear, which is the method ufed by Plato; or as the recital of a converfation, where the author himfelf appears, and gives an account of what paffed in difcourfe, which is the method generally followed by Cicero. In thefe two methods the form may admit of fome variation, but the nature of the compofition is the fame in both, and fubject to the fame laws. A dialogue, in one or other of thefe forms, on fome philofophical, moral, or critical fubject, when it is well conftructed, ranks high among the works of tafte; but it is more difficult of execution, than writers have generally imagined: for it requires more than merely the introduction of different perfons fpeaking in fucceffion. It ought to be a natural and fpirited reprefentation of real converfation; exhibiting the character and manners of the feveral fpeakers, and fuiting to the character of each that peculiarity of thought and expreffion which diftinguifhes him from another. A dialogue, thus conducted, affords the reader a very agreeable entertainment; as by means of the progrefs of the debate among feveral perfonages, he receives a fair and full view of both fides of the argument; and is, at the fame time, amufed with polite converfation, and with a difplay of confiftent and well-fupported characters. An author, poffeffing genius for fuch a kind of compofition, has it in his power both to inftruct and to pleafe. But a compofition of this fort is very different from that of many modern writers of dialogues; in which, if we except the outward forms of converfation, and that one fpeaks and another anfwers, it is altogether the fame as if the author fpoke in perfon throughout the whole. Such a mode of writing is frigid and infipid; it is the form, without the fpirit of converfation.

A dialogue confifts of two parts, an introduction and the body of the difcourfe. The introduction acquaints us with the place, time, perfons, and occafion of the converfation. However the introduction ought not to be too long and tedious. Mr. Addifon complains of this fault: for though, as he fays, fome of the fineft treatifes of the moft polite Latin and Greek writers are in dialogue, as many very valuable pieces of French, Italian, and Englifh appear in the fame drefs; yet in fome of them there is fo much time taken up in ceremony, that before they enter on their fubject, the dialogue is half over. (Dial. II. of Med. ap. init.) As to the body of the difcourfe care fhould be taken, to keep up a juftnefs of character in the perfons that are introduced through the whole of the dialogue: and the characters fhould be fo difcriminated, that it may be known from the words themfelves who is the fpeaker. The principal fpeaker fhould appear to be a perfon of great fenfe and wifdom, and intimate acquaintance with the fubject; and he fhould be capable of fairly anfwering every queftion that may be afked, and every objection that may be ftarted. In the whole difcourfe, all wrangling, peevifhnefs, and obftinacy fhould be avoided; and nothing appear but good humour and good breeding, with a readinefs to fubmit to conviction, as evidence prefents itfelf. Cicero has given us two characters of this kind in Craffus and Antony; from whom Mr Addifon feems to have taken his Philander and Cynthio, in his "Dialogues upon the Ufefulnefs of Ancient Medals." If younger perfons are introduced, they fhould rather inquire than difpute; and neither be too long nor too frequent in the queftions they propofe. Sulpitius and Cotta are made to fuftain this character by Cicero, and Eugenius by Mr. Addifon. A perfon of humour may be alfo introduced to enliven the difcourfe, as Cæfar by Cicero, and Cynthio by Mr. Addifon. With regard to the fubject of a dialogue, all the arguments fhould at leaft appear probable, and nothing be advanced, which may feem weak or trivial. Short and pleafant digreffions are allowed, but they fhould not interrupt the thread of the difcourfe, and break the union of the parts and conftant reference to the main end, which are effential to a dialogue. The time allowed for a dialogue has been various: Cicero allows two days for his three dialogues concerning an orator; but Mr. Addifon extends his to three days, allowing a day for each. The method of compofing dialogues has likewife been various: fometimes a writer relates a difcourfe by way of narrative, which paffed between other perfons; fuch are the dialogues of Cicero and of Mr. Addifon laft mentioned: at other times the fpeakers are introduced in perfon; Cicero's dialogues of "Old Age, of Friendfhip, and of the Parts of Oratory," are written in this manner. Plato and Lucian generally chufe this method. As for the ftyle of a dialogue, the low ftyle is the proper character in which they fhould generally be written. Ward's Orat. vol. ii. p. 221, &c. Blair's Lectures, vol. iii. p. 61, &c.

Dialogue, in *Mufic*, is a compofition for at leaft two voices, or two inftruments, which anfwer each other; and which frequently uniting at the clofe, make a trio with the thorough-bafs.

Such are many of the fcenes in the Italian and French operas.

DIALTHÆA, in *Pharmacy*, is an ointment made (as its name imports) with the althæa or marfh-mallow root. It is now difufed.

DIALYSIS, or DIALISIS, in *Grammar*, a character confifting of two points ¨ placed over two vowels of a word, which would otherwife make a diphthong, but are hereby parted into two fyllables: as in *Mofaïc*. See DIÆRESIS.

DIAM, in *Geography*, a town of Perfia, in the province of Chorafan; 80 miles N. of Herat.

DIAMANT, LA, a town of the ifland of Martinico, on the fouth coaft. N. lat. 14° 26′. W. long. 60° 56′.

DIAMARGARITON, in *Pharmacy*, is an ancient electuary, compofed of pearls and various aromatics. It is difufed or fuperfeded by the prefent aromatic confection.

DIAMARTYRIA, Διαμαρτυρια, in *Antiquity*, a proteftation that the deceafed perfon had left an heir, made to hinder the relations from entering upon the eftate. Potter, Archæol. Græc. tom i. lib. i. cap. 24. p. 128.

DIAMASTIGOSIS. It was a cuftom among the Lacedæmonians, at the folemnization of a feftival bearing this name, for the children of the moft diftinguifhed families to flafh and tear each others bodies with rods before the altars of the gods; the fathers and mothers who were prefent at the fpectacle, animating and exciting them all the while, not to give the leaft fign of pain, or concern; though fome of them were fo feverely lafhed as to die upon the fpot. Such as were victims to this barbarity were crowned before they were buried, and had ftatues erected to their honour. They afterwards contented themfelves with whipping their youths till the blood came. During the ceremony the prieft held in his hand a ftatue of Diana Orthia. This practice they called diamaftigofis, a Greek term derived from διαμαστιγοω, *I whip, fcourge*. The defign hereof, apparently, was no other than to harden their youth, and inure them betimes to blows, wounds, &c. that they might defpife them when they came to war.

The cuftom above defcribed is faid to have had its rife in confequence of an oracle, which ordered that the altar of the goddefs at Sparta fhould be fprinkled with blood. Accordingly they offered every year in facrifice a man chofen for that purpofe. This was changed by Lycurgus into the whipping of boys at her altar. But when the boys were whipped to death, it was the moft cruel method of facrificing them; of which Plutarch, in his life of Lycurgus, declares he had feen feveral inftances. Dacier, in his notes on Plutarch's life of Themiftocles, obferves, that in one of the towns of Arcadia, they ufed to whip the women, as they did the young men or boys round Diana's altar at Sparta; and Potter, in his Greek antiquities, fays, that Bacchus had an altar in Arcadia, upon which a great many young damfels were beaten to death with rods.

DIAMBRA, in *Pharmacy*, is an electuary of the older pharmacopœias, into which ambergris entered as an ingredient, and is now difufed.

DIAMETER, from δια and μετρειν, *to meafure*, in *Geometry*, a right line paffing through the centre of a circle and terminated on each fide by its circumference.

Or, the diameter may be defined a chord paffing through the centre of a circle. Such is the line A E (*Plate* IV. *Geometry*, *fig*. 78.) paffing through the centre C. Hence the diameter is the greateft of all chords, and therefore a line greater than the diameter, drawn from any point within the circle, will cut the circumference. Hence it appears that a line, equal to a given line, lefs than the diameter of the circle, may be applied, or infcribed in a given circle. Hence alfo it appears, that if, to the circumference of a circle A F E B, (*fig*. 79.) from any point D, which is not the centre, right lines D A, D F, D E be drawn, the greateft of all, D A, will be that which paffes through the centre C; and of the reft, that D F, whofe other extreme, F, is placed neareft in the circumference to the extreme, A, of the greateft, will exceed any other, D E, whofe extreme, E, is at a greater diftance. For, from the centre C, draw C E and C F. 1. $AD = DC + CF \sqsubset DF$. 2. Since D C is common, $CF = CE$, and $DCF \sqsubset DCE$. Therefore D F is $\sqsubset$ D E. Whence it follows, that as no two lines, D E, D F, drawn from D, on the fame fide of the diameter, A B, can be equal to each other, three equal right lines cannot poffibly be drawn from the periphery to any point, befides the centre of the circle; and, therefore, if from a point in any circle, three equal right lines can be drawn to the periphery, that point is the centre of the circle. Moreover, no circle can be defcribed to cut another in more points than two; for if it were poffible to cut it in three points, G, E, F, then right lines drawn from the centre, Q, to thofe points would be all equal, which is impoffible, unlefs when the centre Q coincides with C: and then the circles themfelves will neither cut, nor touch, but coincide, and become one circle.

Half a diameter, as CD, (*fig*. 78.) drawn from the centre C, to the circumference, is called the femidiameter, or radius.

The diameter divides the circumference into equal parts. And hence we have a method of defcribing a femicircle upon any line; affuming a point therein for the centre.

To find the ratio of the DIAMETER *to the circumference*.— This has been greatly fought for by the mathematicians; and no wonder; inafmuch as if this were juftly given, the quadrature of the circle were atchieved.

Archimedes firft propofed a method of finding it, by regular polygons infcribed in a circle, till arriving at a fide fubtending an exceeding fmall arc, and then feeking a fide of a fimilar polygon circumfcribed; each of thefe being multiplied by the number of fides of the polygon, give the perimeter of the polygon both infcribed and circumfcribed. In which cafe the ratio of the diameter to the circumference of the circle is greater than that of the fame diameter to the perimeter of the circumfcribed polygon, but lefs than that of the diameter to the perimeter of the polygon infcribed. The difference between both gives the ratio of the diameter to the circumference in numbers nearly true. See CIRCLE, art. 23.

That celebrated author, as already obferved, by polygons of 96 fides, found the ratio of the diameter to the circumference to be as 7 to 22; *viz*. fuppofing the diameter 1, the perimeter of the infcribed polygon is found $3\frac{10}{71}$, and that of the circumfcribed $3\frac{1}{7}$.

After this example, later authors have found out ratios yet nearer truth; Wolfius finds it as 10000000000000000 to 31415926535897932; but none fpent fo much time on it as Van Ceulen, who, after immenfe pains, found that fuppofing the diameter, 1, the circumference is lefs than 3.14159265358979323846264338387950, and yet greater than the fame number with only the laft figure 0 changed into 1. Mr. A. Sharp doubled Van Ceulen's numbers; and this is fo near the truth, that the diameter of the earth being given, we might from thence compute the number of fands equal to the folid contents of the earth fo near as not to differ one grain of fand from the truth. Mr. Machin carried them to one hundred places; thus the circumference of a circle whofe diameter is 1, will be 3.1415926535897932384626433838795028841971693993751058209749445923078164052862089986280348253421170679.

But as fuch prolix numbers are too unwieldly for practice, many of our prefent practical geometricians affume the diameter to be to the circumference as 100 to 314; or in greater

greater circles as 10000 to 31415; in which proportion Ptolemy, Vieta, and Huygens, agree with Van Ceulen. Ad. Metius gives us the ratio 113 to 355, which is the moſt accurate of all thoſe expreſſed in ſmall numbers; as not erring 3 in 10000000. Thoſe in common uſe are Archimedes's, Metius's, or the proportion of 1 to 3.14159.

The DIAMETER *of a circle being given, to find the circumference and area; and the circumference being given, to find the diameter.*—The ratio of the diameter to the circumference being had, as in the laſt article, that of the circumference to the diameter is had likewiſe. Then the circumference being multiplied into the fourth part of the diameter, gives the area of the circle. Thus, if the diameter be 100, the cicumference will be 314, and the area of the circle 7850. But the ſquare of the diameter is 10000: therefore, this is to the area of the circle as 10000 to 7850, that is, as 1000 to 785 nearly.

The area of the circle being given, to find the DIAMETER.—To 785, 1000, and the given area of the circle 246176, find a fourth proportional, *viz.* 3113600, which is the ſquare of the diameter. Out of this extract the ſquare root, and it is the diameter itſelf.

DIAMETER *of a conic ſection*, is a right line biſecting all the ordinates, &c. See CONIC *Sections*.

This, when it cuts the ſaid lines at right angles, is more particularly called the *axis of the curve*, or *ſection*.

DIAMETER, *Tranſverſe*, is a right line, which being continued each way between two curves, biſects parallel right lines between the ſame.

DIAMETER, *Conjugate*, is a right line, biſecting lines drawn parallel to the tranſverſe diameter. See CONJUGATE.

DIAMETER *of any Curve*, is a right line which divides two other parallel right lines, ſo that in each of them, all the ſegments or ordinates on one ſide, between the diameter and different points of the curve, are equal to each other. This is Newton's ſenſe of a diameter. But, according to ſome, a diameter is that line, whether right or curved, which biſects all the parallels drawn from one point to another of a curve. In this way every curve will have a diameter; and hence the curves of the *ſecond* order, have, all of them, either a right-lined diameter, or elſe the curves of ſome one of the conic ſections for diameters. And many geometrical curves of the higher orders may alſo have for diameters, curves of theſe inferior orders.

DIAMETER *of a ſphere*, is the diameter of the ſemicircle by whoſe rotation the ſphere is generated; called alſo the axis of the ſphere.

DIAMETER *of gravity*, is a right line paſſing through the centre of gravity.

DIAMETER, in *Aſtronomy*, is either apparent or real. The apparent diameter of a heavenly body, is the angle which it ſubtends at the place of the obſerver, and it varies inverſely as the diſtance, becauſe ſmall angles are proportional to their tangents.

It is by obſervations of the apparent diameters of the planets, that we are enabled to aſcertain their true diameters, or real magnitudes, having previouſly found their diſtance. See DISTANCE.

In the triangle T A B, (*Plate* IX. *Aſtronomy. fig.* 64.) in which the angle B is a right angle, we have this proportion:

R : ſin. A T B : : T A : A B;

thus the true diameter A B is found by multiplying the diſtance T A by the ſine of the angle A T B, which is the apparent diameter of the planet.

The apparent diameter of the ſun is continually changing, and the law of its variation affords a ſtrong proof of the elliptic nature of the earth's orbit, and that the motion of the earth is really ſlower, as its diſtance from the ſun is greater. For the diameter of the ſun is about $31' 31''$ in ſummer, and $32' 36''$ in winter; from which it is evident, that its diſtance in ſummer is to its diſtance in winter, as $32' 36''$ to $31' 31''$. The hourly motion of the ſun in winter is $2' 33''$; and $32' 36'' : 31' 31'' :: 2' 33'' : 2' 28''$. Therefore, the hourly motion in ſummer would be $2' 28''$, if it was really uniform, and its apparent variation occaſioned only by our greater or leſs diſtance from the ſun. But by obſervation, the hourly motion in ſummer is only found to be $2' 23''$: ſo that beſides the diminution of $5''$, cauſed by the increaſe of diſtance, there is a farther dimunition of $5''$, which can only be attributed to a decreaſe of velocity in the motion of the earth.

It is only ſince the application of teleſcopes to aſtronomical inſtruments that the diameters of the ſun and planets have been accurately determined.

There are ſeveral methods of determining the diameter of the ſun: By micrometers; by obſerving the time of its paſſage over the meridian wire of a tranſit inſtrument; by the difference of altitude between its upper and lower limb, as obſerved by a mural quadrant or good circular inſtrument, or by a repeating circle.

The meaſurements which uſually have been conſidered as the beſt, and which have been adopted in our ſolar tables, have been made with object-glaſs micrometers. De la Lande, in the year 1760, determined the diameter (apogee) $31' 30\frac{1}{2}''$. Dr. Maſkelyne $31' 29''.2$. Short, with an object-glaſs micrometer, applied to a two foot teleſcope, $31' 28''$. There is neceſſarily ſome ſmall uncertainty in the meaſure by a micrometer from the difficulty of obtaining the accurate value of its ſcale of diviſions. Some ſmall difference will likewiſe ariſe from the nature of the teleſcope employed.

A good aſtronomical circle, moving eaſily in azimuth, would be well adapted for this determination; as ſeveral obſervations might be made before and after the meridian paſſage, and the correction for change of altitude, applied by the table calculated for that purpoſe, and which we have given under DECLINATION.

Perhaps the repeating circle of Borda would be ſtill preferable. Of the extreme accuracy that may be obtained by repeating the angle, even with a ſmall inſtrument, we may form ſome idea from a ſeries of obſervations, made by M. Quenot, and inſerted in the Connaiſſance des Temps for the year 1803. He repeated the meaſure of the diameter of the ſun a thouſand times, and the obſervations divided into ten parts of one hundred each, were as follows:

$52° 32' 30''$	Diameter (apogee) deduced	$31' 31''.5$
52 30	——————	31 30
52 33	——————	31 31.8
33	——————	31 31.8
31	——————	31 30.6
33	——————	31 31.8
29	——————	31 29.4
30 30	——————	31 30.3
34 30	——————	31 32.7
30	——————	31 30

Mean $31' 31''$.

The inſtrument uſed was a reflecting circle of Borda of 5 inches radius.

This quantity is the ſame as is adopted by Delambre in his ſolar tables lately publiſhed. Annexed to this article is a table of the ſun's ſemidiameter to every degree of mean anomaly. The variation in the apparent ſemidiameter of the ſun correſponds with the variation of the ſun's horizontal parallax, which is, in fact, the apparent ſemidiameter of the earth, as ſeen from the ſun; they of courſe increaſe and decreaſe together, and inverſely as the diſtance of the two bodies

bodies from each other, as appears from the ſame table, in which the parallax is likewiſe given.

If we examine the meaſures that have been given by different aſtronomers, of the diameter of the ſun, it will be found that they have a tendency to diminiſh as they approach the preſent time; a ſuſpicion has hence ariſen that the ſun may poſſibly be decreaſing in magnitude. But this is ſo highly improbable, that we are inclined to attribute the circumſtance partly to accident and partly to the improvement of teleſcopes, which render the apparent image of the ſun ſomewhat ſmaller.

The difference between the greateſt and leaſt diameters of the ſun is 64.″6.

The ſemidiameter of the ſun, divided by the correſponding parallax, (table I.) gives a conſtant quantity, which expreſſes the ratio of the diameters of the ſun and the earth.

Thus, $\frac{16'\ 1''.1}{8''.8} = 109.2$.

According to De la Lande, who aſſumes the ſun's horizontal parallax, 8″.6; the ſun's diameter is to that of the earth as 111 : 1.

From which it appears, that if the centre of the ſun be ſuppoſed placed in the ſame point as the centre of the earth, the globe of the ſun would then extend to a diſtance nearly twice as great as the orbit of the moon.

In calculations of eclipſes, it is uſual to diminiſh the diameter of the ſun 5″ or 6″, to allow for the irradiation, which makes the apparent diſk of the ſun appear greater than it otherwiſe would do.

The apparent diameter of the moon varies from 29′ 22″ to 33′ 34″: its mean diameter being nearly equal to the leaſt apparent diameter of the ſun.

The variations in the diameter of the moon are much greater than in the diameter of the ſun, as it is in ſome meaſure affected by almoſt all the lunar irregularities.

Theſe variations indicate a correſponding change in her diſtance. Horrox, as long ſince as the year 1638, obſerved, that the moon being apogee, was not always at the ſame diſtance from the earth, that the diameter was leaſt in the conjunctions apogee, and greateſt in the ſyzigies perigee.

When the argument of the evection is O ſigns, the diameter is diminiſhed 18″ or 20″; but when the argument of evection is VI ſigns, it is, on the contrary, augmented by the ſame quantity, though its diſtance from the apogee ſhould, in both caſes, be the ſame. In the ſame manner with reſpect to the argument of the variation, when that is O or VI ſigns, the diameter of the moon increaſes 14″ or 15″; and when the argument is III or IX ſigns; it decreaſes by the ſame quantity, though at the ſame diſtance from the apogee. See Evection and Variation.

The expreſſion for the diameter of the moon for any given time is nearly this:

31.′ 7.″3 − 1.42.″3 coſ. anomal + 5.″4 coſ. 2 anomal. + 13.″7 coſ. 2 diſt. ☽ ☉ − 20.″2 coſ. (2 diſt. ☾ ☉ − anomal ☽) the other equations are ſcarcely ſenſible; but they may be included by taking the equatorial parallax as an argument for the ſemidiameter, as in the new lunar tables, by Burg, publiſhed by the Bureau des Longitudes, at Paris.

As the moon approaches the zenith, her diſtance becomes leſs, and the apparent diameter is increaſed. Let T (*fig.* 65.) be the centre of the earth, O the place of an obſerver on the ſurface, Z the moon ſuppoſed to be in the zenith. The diſtance Z O is about $\frac{1}{60}$ part leſs than the diſtance Z T; its diameter, therefore, ſeen from O, will be greater than if ſeen from T in the ſame proportion.

If the moon be at L, its zenith diſtance being the angle L O Z, the diſtance L O will be evidently leſs than the diſtance L T. When the moon is at the horizon at H, the augmentation will be nearly inſenſible, for which reaſon we conſider the horizontal ſemi-diameter as equal to that which would be ſeen from the centre of the earth; but this is not quite correct, for the moon muſt be below the horizon, by a quantity equal to half her parallax, for the augmentation to be really equal O; that is when the triangle L O T is iſoſceles.

When the horizontal diameter of the moon is known, it is eaſy to compute the augmented diameter, ſince they are to each other as L O to L T.

In the triangle L O T, the angle O is the ſupplement to the apparent zenith diſtance; the angle L T O is the true zenith diſtance, as ſeen from the centre of the earth: and L O : L T :: ſine O T L : ſin. L O T or L O Z. Therefore, the horizontal diameter is to the apparent diameter, as the ſine of the true zenith diſtance of the moon, as ſeen from the centre of the earth, is to the apparent diſtance, as ſeen from the point O. The augmented diameter of the moon may be found, therefore, by this proportion.

As coſ. of true altitude is to coſ. of apparent altitude, ſo is the horizontal diameter to the augmented diameter. The difference between the two is called the augmentation of the moon's diameter; a table of which has been given under Declination.

In the above computation, if the moon is very near the zenith, her diſtance from the centre and ſurface of the earth ſhould be employed inſtead of the zenith diſtances.

The diameter of the moon may be meaſured in the ſame manner as that of the ſun, or it may be inferred with great accuracy, from the time which elapſes between the immerſion and emerſion of a fixed ſtar. M. Burg, who computed it by this latter method for his lunar tables, found no difference from the reſult, by an object glaſs micrometer of Dollond.

The apparent diameters of the planets, at leaſt of thoſe near to us, vary much more than the diameters of the ſun and moon.

The diameter of a planet, when its diſtance is equal to the mean diſtance of the ſun, being divided by the diſtance of the planet from the earth, gives its actual or apparent diameter as ſeen from the earth; and the diſtance is found by this proportion: As the ſine of the elongation, is to the ſine of the commutation, ſo is the diſtance of the planet from the ſun reduced to the ecliptic, to the diſtance from the earth in the plane of the ecliptic. This diſtance divided by the geocentric latitude, is the diſtance of the planet from the earth.

The moſt favourable opportunity of obſerving the diameter of Mercury is when he paſſes over the diſc of the ſun. It may either be meaſured directly by a micrometer, or computed by the time it takes to paſs over the edge of the ſun.

De la Lande meaſured the diameter of Mercury on the ſun's diſc, in 1753, with an object glaſs micrometer adapted to a teleſcope of 18 feet, and found it 11.″8. At that time the diſtance of Mercury to the earth, was to the mean diſtance of the ſun to the earth, as 55674 to 101007.

Therefore, 1010 : 557 :: 11.″8 :: 6.″5.

Hence, 6.″5 is the diameter of Mercury, at a diſtance equal to the mean diſtance of the ſun.

Dr. Bradley, by a ſimilar method, with a teleſcope of 120 feet, in 1723, found the diameter on the ſun's diſc 10.″7, which gives 7.″3 for the mean diſtance. By computing it from the time it took to quit the diſc, De la Lande found 5.″9.

The diameter of Venus is found in the ſame manner, and with extreme accuracy, for every ſecond of the diameter of Venus employs 19″ to quit the diſc of ſun. And as it is not eaſy to miſtake 5″ in the length of time the planet takes to

to quit the difc, the diameter of Venus may be known to a quarter of a fecond.

When the fecond limb of the planet touches the exterior limb of the fun in E, (*fig. 66.*) Venus is at the point F in her orbit, and the diftance C E of the centres of the planet and the fun, is equal to the fum of their femi-diameters; on the contrary, in the interior contact, Venus is at D, and the diftance of their centres is equal to the difference of their femi-diameter.

The fhorteft diftance C B is fuppofed known; therefore, by refolving feparately the two triangles, C B D, C B F, we obtain the two portions of the planet's orbit B D, B F: their difference D F gives the length of time the planet fhould employ to quit the difc, as obferved from the centre of the earth. Proper allowance being made for parallax, the tranfit in 1761 gave 57."9, and that of 1769, 57."2, according to De la Lande. See TRANSIT *of Venus* and PARALLAX.

Picard meafured the diameter of Mars on the 8th Sept. 1762, and it appeared to him to be 30". This obfervation reduced to the mean diftance of the fun from the earth, is equal 11."4; according to Monnier, 9."9; by Rochon, with a prifmatic micrometer, 8."9.

The diameter of Mars was very acurately determined by Dr. Herfchel, in 1783 (Philof. Tranf. 1784). He eftimates the diameter 8."94, and the difference of $\frac{1}{16}$ between the equatorial and polar diameter. This fuppofes the planet's diftance equal to the mean diftance from the fun.

The diameter of Jupiter was obferved in the year 1719, by Pound, with a micrometer applied to a telefcope of 123 feet. He found it always between 38" and 40"; generally 39". By the length of time which the firft and third fatellite employed to pafs over the difc, obferved with the fame telefcope, Newton computed its diameter $27\frac{1}{4}$" at its mean diftance: this would give 3′ $13\frac{3}{4}$", at the diftance of the fun from the earth.

But aftronomers prefer a direct meafure by a micrometer. The equatorial diameter of Jupiter is found to exceed the polar diameter, in the proportion of 1.073 : 1.

The diameter of Saturn, obferved by Pound, was 18", and the diameter of the ring 42".

Dr. Herfchel, from a mean of a great many meafures of the larger ring, makes it 46".67, at the mean diftance of Saturn.

The dimenfions of the two rings are in the following proportions:

	Parts.
1. Infide diameter of the fmaller ring - -	5900
2. Outfide diameter - - - - -	7510
3. Infide diameter of the larger ring - -	7740
4. Outfide diameter - - - - -	8300
5. Breadth of the inner ring - - -	805
6. Breadth of the outer ring - - -	280
7. Breadth of the fpace between the rings -	115

which may be thus expreffed in Englifh miles:

1.	146,345
2.	184,393
3.	190,248
4.	204,883
5.	20,000
6.	7,200
7.	2,839

The diameter of the planet, at its mean diftance, is 1.8"

A great difference of opinion exifts, relative to the apparent diameters of the new planets, Ceres, Pallas, Juno, and Vefta.—According to Dr. Herfchel, none of their diameters fubtend an angle of half a fecond, at the diftance of the earth from the fun, but Mr. Schroeter eftimates Ceres at 3" 5, and Pallas 4".5.

The diameters of Jupiter's fatellites have been eftimated by the time they employ to enter the fhadow of the planet.

According to Bailly, they fubtend the following angles, as feen from Jupiter.

I.	60′	20"
II.	29	42
III.	22	28
IV.	9	39

Mr. Schroeter, who has made a great number of obfervations on the fatellites of Jupiter, with a view of afcertaining their diameters, objects to the method of Bailly, and prefers employing the time which the fatellites take to difappear behind the body of the planet, or to enter on the difc when they pafs over it. This method, with a telefcope of high power, feems capable of great exactnefs. The refult of M. Schroeter's obfervations is as follows.

	I.	II.	III.	IV.
Time employed to enter the difk - - -	235"	245".3	544".5	505
Diameters feen from Jupiter - - -	33′ 16"	17′ 13′	18′.59′	7′.32"
True diameters in miles 15 to a degree - -	564	465	818	570
In miles 60 to a degree	2256	1860	3272	2280
In proportional parts of diam. of ♃ - -	$\frac{1}{34}$	$\frac{1}{42}$	$\frac{1}{24}$	$\frac{1}{34}$
Diameter viewed from the earth. ♃ perigee	1.403	1.15	2.04	1.42
The fame by direct meafurement - - -	1.39	1.09	2.27	1.41
By direct meafure of the fhadow - - -	1.01	0 91	1.88	——
Diam. at the mean dift. of earth from ☉, that of Jupiter being 3′ 13".5	5.53	4 54	8.05	5.60
Diameters. Jupiter being fuppofed 1 - -	0.0288	0.0238	0.0418	0 0291

They do not appear to differ much in magnitude from each other, they are about $\frac{1}{20}$th of the diameter of Jupiter, or nearly one half of the diameter of the earth.

Diameters of the fun, moon, and planets, according to different aftronomers.

Diameter of the Sun.							
		′	"	′	"	′	"
Ariftarchus and Archimedes	A.C. 260	30	0.0	30	0.0	30	0.0
Ptolemy	A.D. 120	33	20.0	32	18.0	31	20.0
Albatennius	900	33	40.0	32	28.0	31	20.0
Regiomontanus	1460	34	.00	32	27.0	31	0.0
Copernicus	1510	33	54.0	32	44.0	31	40.0
Tycho	1570	32	0.0	31	0.0	30	0.0
Kepler	1600	31	4.0	30	30.0	30	0.0
Riccioli	1640	32	8.0	31	40.0	31	0.0
Jean Dominique Caffini	1660	32	46.0	32	13.0	31	40.0
Gafcoigne	1640	32	50.0			31	40.0
Picard and Auzout	1670					31	38
Flamftead	1680	32	48.0			31	30.0
Mouton	1665	32	32.0			30	29.0
De la Hire	1685	32	44.0	32	11.06	31	38.0
Louville	1720	32	37.7			31	32.50
Jean Jaques Caffini	1740	32	37.50	32	5.0	31	32.50
Halley	1720					31	38
Monnier				32	5.0		

Diameter of the Sun—*continued.*

		′ ″	′ ″	′ ″
Bradley (by the time of sun's transit)	1750			31 30.5
Short	1760	32 33.0		31 28.0
La Caille in his solar tables	1758			31 34.0
De la Lande	1760			31 31.5
Maskelyne				31 29.2
Piazzi	1792	mean of 70 obs.		31 32.5
By Delambre's tables		32 35.6	32.2	31 31.0

Diameter of the Moon.

Ptolemy		35 20.0		31 20.0
In the conjunction Tycho		28 48.0		25 36.0
In the opposition		36 0.0		32 0.0
Kepler		32 44.0		30 0.0
De la Hire		33 30.0		29 30.0
In syzygy, sir I. Newton			31 30.0	
In quadrature			31 30.0	
Full, in perigee, Mouton		33 29.0		
In syzygy, Monnier			31 30.0	
In quadrature			31 0.0	
By Burg's tables		33 50.6		28 55.8

Diameter of Saturn.

Albatennius			1 44.50	
Alfraganus			1 44.50	
Tycho		2 12.0	1 50.0	1 34.0
Hevelius	1660	0 19.0	0 16.0	0 14.0
Hortensius		0 42.60	0 37.0	0 31 0
Kepler		0 30 0		
Riccioli		1 12.0	0 57.0	0 46.0
Huygens				0 30.0
Flamstead		0 25.0		
Sir I. Newton, from the observations of Pound			0 16.0	
Monnier			0 16.0	
Saturn's ring, according to Huygens			1 4.0	1 8.0
Sir I. Newton, from the observations of Pound			0 40.0	
Monnier			0 42.0	

Diameter of Jupiter.

Albatennius and Alfraganus			2 36.7	
Tycho		3 59.0	2 4 5.0	2 14.0
Hevelius		0 24.0	0 1 8.0	0 14.0
Hortensius		1 1.6	0 50.0	0 38.5
Kepler		0 50.0		
Riccioli		1 8.7	0 49.7	0 38.3
Huygens				1 4.0
Flamstead		0 54.0		
Sir I. Newton, from the observations of Pound			0 37.2	

Diameter of Jupiter—*continued.*

		′ ″	′ ″	′ ″
Pound's observation uncorrected for irradiation			0 39.0	
Monnier			0 37.0	

Diameter of Mars.

Albatennius and Alfraganus			1 34.0	
Tycho		6 46.0	1 14.0	0 57.0
Hevelius		0 20 0	0 5.0	0 2.0
Hortensius		1 4.0	0 36.0	0 9.0
Kepler		6 30.0		
Riccioli		1 32.0	0 22.0	0 10.1
Huygens				0 30.0
Flamstead		0 33.0		
Monnier				0 26.0

Diameter of Venus.

Albatennius		3 8.0		
Alfraganus		1 34.0		
Tycho		4 40 0	3 15.0	1 52.0
Hevelius		1 5.0	0 16.0	0 9.0
Hortensius		1 40.0	0 53.0	0 15.3
Kepler		7 6.0		
Riccioli		4 8.0	1 4.2	
Huygens				1 25.0
Flamstead		1 12.0		
Horrox	1635	1 18.30		
Crabtree	1639	1 9.0		
Monnier			1 17.0	
By the transit of 1761			0 58.0	
By the transit of 1769			0 59.0	

Diameter of Mercury.

Albatennius			2 5.3	
Alfraganus			1 15.2	
Tycho		3 57.0	2 10.0	1 29.0
Hevelius		0 11.0	0 6.0	0 4.0
Hortensius		0 28.0	0 19.0	0 10.0
Riccioli		0 25.2	0 13.8	0 9.3
Bradley		0 10.45		
Monnier				0 10.0

Table I.

	Apparent mean Diameter, as seen from the Earth.	Mean Diameters at the Distance of the Sun.	Mean Diameters in English Miles.	Mean Diameters as seen from the Sun.	Apparent Diameter of the Sun.	Proportional Diameters.
Sun	32 ′ 2		883246			110
Moon	31 8	0′ 4″.7	2180	4.″6	32′	0.27
Mercury	0 7	0 7.0	3224	16.0	80	0.4
Venus	16.5	0 16.5	7687	300	46	0.9
Earth		0 17.4	7912	17.4	32	1
Mars	11	0 8.9	4189	10.0	21	0.5
Ceres		Her. 0.35 Schro. 5.5	doubtful—probably none less than 100 miles, nor greater than 400.			
Pallas		H. 0.32 S. 4.5			12	
Juno						
Vesta						
Jupiter	0 39	3 6.8	89170	37.	6.1	11.6
Saturn	18	2 51.7	79040	16.0	3.4	9.8
Herschel	4	1 14.5	35100	4.0	1 6	4.25

Table II.

Semi-diameter of the Sun for every Degree of Mean Anomaly.

Argument. Mean Anomaly.										
	Sig. 0.			Sig. I.			Sig. II.			
Deg.	Semidiam.	Days of the Month.	Paral.	Semidiam.	Days of the Month.	Paral.	Semidiam.	Days of the Month.	Paral.	Deg.
	′ ″		″	′ ″		″	′ ″		″	
0	16 17.79	Jan. 1.	8.95	16 15.49	Feb. 1.	8.93	16 9.30	Nov. 1.	8.87	30
1	16 17.79		8.95	16 15.34		8.93	16 9.05		8.87	29
2	16 17.78	Dec. 30.	8.95	16 15.18	Nov. 30.	8.93	16 8.79	Oct. 30.	8.87	28
3	16 17.77		8.95	16 15.02		8.92	16 8.54		8.87	27
4	16 17.75		8.95	16 14.85		8.92	16 8.28		8.86	26
5	16 17.73		8.95	16 14.69		8.92	16 8.02		8.86	25
6	16 17.70		8.95	16 14.51		8.92	16 7.75		8.86	24
7	16 17.66		8.95	16 14.34		8.92	16 7.49	Mar. 10.	8.86	23
8	16 17.62		8.95	16 14.16		8.92	16 7.22		8.85	22
9	16 17.58	Jan. 10.	8.95	16 13.97	Feb. 10.	8.91	16 6.95		8.85	21
10	16 17.53		8.95	16 13.78		8.91	16 6.68		8.85	20
11	16 17.47		8.95	16 13.59		8.91	16 6.41		8.85	19
12	16 17.41	Dec. 20	8.95	16 13.39	Nov. 20.	8.91	16 6.14	Oct. 20.	8.84	18
13	16 17.35		8.95	16 13.20		8.91	16 5.86		8.84	17
14	16 17.28		8.95	16 12.99		8.91	16 5.59		8.84	16
15	16 17.20		8.95	16 12.78		8.90	16 5.31		8.84	15
16	16 17.12		8.94	16 12.57		8.90	16 5.04		8.83	14
17	16 17.04		8.94	16 12.36		8.90	16 4.76	Mar. 20.	8.83	13
18	16 16.95		8.94	16 12.14		8.90	16 4.48		8.83	12
19	16 16.85	Jan. 20.	8.94	16 11.92	Feb. 20.	8.90	16 4.20		8.83	11
20	16 16.75		8.94	16 11.69		8.89	16 3.92		8.82	10
21	16 16.65		8.94	16 11.46		8.89	16 3.64		8.82	9
22	16 16.54	Dec. 10	8.94	16 11.24	Nov. 10.	8.89	16 3.36	Oct. 10.	8.82	8
23	16 16.42		8.94	16 11.01		8.89	16 3.07		8.82	7
24	16 16.30		8.94	16 10.77		8.89	16 2.79		8.81	6
25	16 16.18		8.94	16 10.54		8.88	16 2.51		8.81	5
26	16 16.05		8.93	16 10.29		8.88	16 2.23		8.81	
27	16 15.92		8.93	16 10.05		8.88	16 1.95	Mar. 30.	8.80	4
28	16 15.78		8.93	16 9.80	Mar. 1.	8.88	16 1.67		8.80	3
29	16 15.63	Jan. 30.	8.93	16 9.55		8.87	16 1.38		8.80	2
30	16 15.49		8.93	16 9.30		8.87	16 1.10		8.80	
	Sig. XI.			Sig. X.			Sig. IX.			

If the ſemi-diameter at the mean diſtance be ſuppoſed to vary by 1″, there reſults this variation for any other ſemi-diameter $1'' + 0''.17$ coſ. (Long. ⊙ + 2ˢ 20° ½).

Table

TABLE II.—*continued.*

Semi-diameter of the Sun for every Degree of Mean Anomaly.

Argument. Mean Anomaly.										
	Sig. III.			Sig. IV.			Sig. V.			
Deg	Semidiam.	Days of the Month.	Paral.	Semidiam.	Days of the Month.	Paral.	Semidiam.	Days of the Month	Paral.	Deg.
	′ ″		″	′ ″		″	′ ″			
0	16 1.10	April 1.	8.80	15 53.17		8.72	15 47.53		8.67	30
1	16 0.82		8.79	15 52.94	Aug. 30	8.72	15 47.40		8.67	29
2	16 0.54	Sep. 30.	8.79	15 52.70		8.72	15 47.27	July 30.	8.67	28
3	16 0.26		8.79	15 52.48		8.72	15 47.15		8.67	27
4	15 59.98		8.78	15 52.25		8.72	15 47.03		8.67	26
5	15 59.70		8.78	15 52.03		8.71	15 46.92		8.67	25
6	15 59.42		8.78	15 52.81		8.71	15 46.81		8.67	24
7	15 59.14		8.78	15 51.59		8.71	15 46.70		8.67	23
8	15 58.87		8.78	15 51.37	May 10.	8.71	15 46.60		8.66	22
9	15 58.59	April 10.	8.77	15 51.16		8.71	15 46.50	June 10.	8.66	21
10	15 58.32		8.77	15 50.96		8.70	15 46.41		8.66	20
11	15 58.05		8.77	15 50.75	Aug. 20.	8.70	15 46.32		8.66	19
12	15 57.77	Sep. 20.	8.77	15 50.55		8.70	15 46.24	July 20.	8.66	18
13	15 57.50		8.77	15 50.35		8.70	15 46.16		8.66	17
14	15 57.23		8.77	15 50.15		8.70	15 46.08		8.66	16
15	15 56.96		8.77	15 49.96		8.69	15 46.01		8.66	15
16	15 56.70		8.76	15 49.77		8.69	15 45.95		8.66	14
17	15 56.44		8.75	15 49.59		8.69	15 45.88		8.66	13
18	15 56.17	April 20.	8.75	15 49.41	May 20.	8.69	15 45.83		8.66	12
19	15 55.91		8.75	15 49.23		8.69	15 45.78	June 20.	8.66	11
20	15 55.65		8.75	15 49.06		8.69	15 45.73		8.66	10
21	15 55.39		8.74	15 48.89	Aug. 10	8.69	15 45.68		8.66	9
22	15 55.13	Sep. 10	8.74	15 48.72		8.68	15 45.64		8.66	8
23	15 54.88		8.74	15 48.56		8.68	15 45.61	July 10	8.66	7
24	15 54.63		8.74	15 48.40		8.68	15 45.58		8.65	6
25	15 54.38		8.74	15 48.24		8.68	15 45.55		8.65	5
26	15 54.14		8.73	15 48.09		8.68	15 45.53		8.65	4
27	15 53.89		8.73	15 47.94		8.68	15 45.52		8.65	3
28	15 53.65	April 30.	8.73	15 47.80	May 30.	8.68	15 45.51	June 30.	8.65	2
29	15 53.41		8.73	15 47.66		8.67	15 45.50		8.65	1
30	15 53.17		8.72	15 47.53		8.67	15 45.50		8.65	0
	Sig. VIII.			Sig. VII.			Sig. VI.			

TABLE

TABLE III.

Semi-diameter of the Sun in Siderial and Mean Time.

Months.	Sun's true Longitude.	Siderial Time.	Mean Time.	Months.	Sun's true Longitude.	Siderial Time.	Mean Time.
	′ °	′ ″	′ ″		′ °	′ ″	′ ″
21 March	0	1 4.5	1 4.3	23 Sept.	VI. 0	1 4.1	1 3 9
26	5	4 4	4.2	28	5	4.2	4.0
31	10	4.5	4.2	3 Oct.	10	4.4	4.2
5 April	15	4.5	4 3	9	15	4.7	4 5
10	20	4.7	4 5	14	20	5.1	4 9
15	25	4.9	4.7	19	25	5.5	5.3
20	I. 0	5.2	5.0	24	VII. 0	6.0	5.8
25	I. 5	5.6	5.4	29	VII. 5	6.5	6.3
1 May	10	6.0	5.8	3 Nov.	10	7.1	6.9
6	15	6.4	6.2	8	15	7.7	7.5
11	20	6 8	6 6	13	20	8.3	8.1
16	25	7.2	7.0	18	25	8.8	8.6
21	II. 0	7.6	7.4	22	VIII. 0	9.4	9.2
27	II. 5	8.0	7.8	27	VIII. 5	9.9	9.7
1 June	10	8.3	8.1	2 Dec.	10	10 3	10.1
11	15	8.5	8.3	7	15	10.7	10.5
16	20	8.7	8.5	12	20	11 0	10.8
22	25	8.8	8.6	17	25	11.1	10.9
22	III. 0	8.9	8.7	22	IX. 0	11.2	11.0
27	III. 5	8.8	8.6	27	IX. 5	11.1	11.0
2 July	10	8 7	8.5	1 Jan.	10	11.0	10.8
7	15	8.5	8.3	6	15	10.8	10.6
13	20	8.2	8.0	11	20	10.5	10.3
18	25	7 8	7.6	16	25	10.1	9.9
23	IV. 0	7.4	7.2	20	X. 0	9.6	9.4
28	IV. 5	7.0	6 8	25	X. 5	9.1	8.9
3 Aug.	10	6.5	6.3	30	10	8.5	8.3
8	15	6.1	5 9	4 Feb.	15	7.9	7.7
13	20	5.7	5.5	9	20	7 4	7.2
18	25	5 3	5.1	14	25	6.8	6 6
23	V. 0	4 9	4.7	19	XI. 0	6.3	6 1
29	V. 5	4.6	4.4	24	XI. 5	5.8	5.6
3 Sept.	10	4.3	4.1	1 March	10	5 4	5.2
8	15	4.1	3 9	6	15	5.1	4.9
13	20	4.0	3 8	11	20	4.8	4.6
18	25	4.0	3.8	16	25	4.6	4.4
23	VI. 0	4.1	3.9	21	XII. 0	4.5	4.3

DIAMETER *of a Column*, is its thicknefs juft above the bafe. From this the module is taken, which meafures all the other parts of the column.

DIAMETER *of the Diminution*, is that taken from the top of the fhaft. See DIMINUTION.

DIAMETER *of the Swelling*, is that taken at the height of one-third from the bafe.

DIAMINTZ, or DUNAMUND, in *Geography*, a town of Ruffia, in the government of Riga, on the coaft of the Baltic; 12 miles N. W. of Riga.

DIAMIUM, in *Ancient Geography*, *Gianutti*, an ifland of Italy, in the vicinity of that of Igillium.

DIAMOND; *Diamant*, Fr.; *demant*, Germ.; adamas *of ancient authors*.

The diamond has from the remoteft antiquity been confidered as the moft valuable, or more properly, the moft coftly fubftance in nature. The reafon of the high efteem in which it was held by the ancients, was its rarity and its extreme hardnefs; for, the art of cutting and polifhing this gem, not having been then invented, its fuperior brilliancy and luftre could not be duly appreciated. The fhort account which Pliny (Hift. Nat. lib. 37. § 15.) gives of this fubftance, contains more error than truth: we fhall, however, commence our article by a detail of thefe particulars, as they conftitute the whole of the information handed down to us by the ancients concerning this, the moft precious of all the productions of art or nature.

The diamond, fays Pliny, is the moft coftly of human poffeffions;

poſſeſſions: it was found diſſeminated like gold, through metallic veins; but was of very rare occurrence, and was always accompanied by gold. The moſt ancient writers deſcribe it as found only in Ethiopia, between the iſland Meroe and the temple of Mercury; and as reſembling a cucumber ſeed both in ſhape, ſize, and colour. It has of late, continues the ſame author, been brought from India. The Indian diamond is not found in gold mines, and appears to have ſome relation to rock-cryſtal, ſince it reſembles this ſubſtance in its colourleſs tranſparency, and in its form, which is either that of a ſmooth ſix-ſided priſm, terminated in a point on one extremity, or of two pyramids united by their baſes. Its magnitude is ſometimes equal to that of a hazel nut. The Arabian diamond reſembles the above, only it is ſmaller. The diamond is diſtinguiſhed from all other ſubſtances by its hardneſs, which is ſuch as to break and ſplinter both the hammer with which it is ſtruck, and the anvil on which it lies. It is incapable alſo of being heated by the moſt violent fire: on both which accounts it is called by the Greeks *adamas*, that is, unconquerable. But though it reſiſts the action of fire and ſteel, yet if macerated in the freſh blood of a he-goat, it may, with difficulty, be ſplit by a hammer. The ſmall ſhivers thus obtained are much ſought after by engravers on gems; for when ſet in an an iron handle, they enable the artiſt readily to cut the hardeſt ſtones. A kind of antipathy ſubſiſts between the diamond and magnet, ſo that the latter cannot attract iron when in contact with the former. The diamond alſo deſtroys the effect of poiſons, and cures inſanity, on which account it is called by ſome *anachitis*. So far concerning the knowledge poſſeſſed by the ancients of this gem.

When the Arabians, during the dark ages of Europe, had eſtabliſhed themſelves in Spain, and on the ſouthern and eaſtern coaſts of the Mediterranean ſea, the wild and monſtrous fictions of theſe and other oriental nations, obtained a currency in Europe, which even at preſent has not entirely ceaſed. Among other abſurdities, the occult qualities and ſuperſtitious uſes of the gems was adopted with peculiar eagerneſs, and, no doubt, contributed greatly to the high eſtimation in which theſe ſubſtances were held. The diamond, as being the moſt valuable and beautiful of the gems, was ſuppoſed to be endowed with theſe hidden virtues in the higheſt degree: hence it was held as an infallible ſpecific in many diſeaſes, a teſt of conjugal fidelity, a reconciler of domeſtic ſtrife, and an amulet of higheſt power againſt poiſons, inſanity, witchcraft, incantations, nocturnal goblins, and evil ſpirits.

At length, after a long night of intellectual darkneſs, men began to be convinced, that the beſt way of acquiring a knowledge of the properties of natural ſubſtances, was by an inveſtigation of facts, inſtead of appealing to the fancy. Yet it was a long time before the falſe facts and idle fancies concerning the gems in general, and the diamond in particular, began to give way to experiment and common ſenſe; for Rulandus in his "Lexicon Alchemiæ," firſt publiſhed in 1607, gives an account of the diamond, even more incorrect than that which Pliny has left us. Two years after this period, however, namely, in 1609, Boetius de Boot publiſhed his valuable treatiſe "De Lapidibus et Gemmis," in which is contained a detailed account of all that was previouſly known or imagined concerning the diamond, and accompanied by his own obſervations and remarks. The whole article is too long to be tranſlated and inſerted in this place, but is well worthy of peruſal as a very curious ſpecimen of the method employed by men of real candour and underſtanding in treating of thoſe ſubjects of natural hiſtory, that were as yet not wholly emancipated from the influence of ſuperſtition. He firſt obſerves, that the diamond is diſtinguiſhed from other gems, by the ſuperior luſtre which it exhibits, when fixed in a plate of black maſtich, and the force with which they adhere to each other. This he attributes to a kind of affinity between theſe two ſubſtances; from which circumſtance, and becauſe the diamond, when heated, attracts ſmall ſtraws, &c. as amber does, he concludes that this gem differs from the others, in being of an inflammable, ſulphureous, and oily nature. From this circumſtance, certain modern writers have claimed for De Boot the honour of being the firſt who has maintained the inflammability of the diamond. There is ſurely however a great difference between arriving at truth by means of falſe or true premiſes. Romé de Liſle, who made the experiment with great care, affirms, that rock cryſtal adheres to maſtich with at leaſt as much firmneſs as the diamond does; and it is a fact perfectly well aſcertained, that tourmaline, and many other mineral bodies, that are well known to contain no inflammable matter in their compoſition, will, when warmed or rubbed, attract various light bodies; ſo that the facts adduced by De Boot do not juſtify his concluſion. Newton, on the other hand, ſuſpected the inflammability of the diamond, becauſe in its power of refracting light, it differed greatly from all earthly bodies, and obviouſly ranked in this reſpect among the inflammable ones; an obſervation which all ſubſequent experience has only ſerved to confirm.

But though De Boot has fallen into the error abovementioned, it ſhould be remarked to the credit of his account of the diamond, that he points out with conſiderable exactneſs the diamond mines of India and Malacca, and is much inclined to doubt the genuineneſs of all the diamonds ſaid to be found in Europe. He diſproves, from experiment, the aſſertions of Pliny reſpecting the impoſſibility of breaking this ſubſtance; and alſo ſhews, that it exerciſes no power over the property of attracting iron, poſſeſſed by the magnet. With regard to the ſuperſtitious and metaphyſical properties of the diamond, though he does not venture to deny them altogether, yet he maintains that they are not to be attributed to the gem itſelf, but to the angelic ſpirits, which it has pleaſed the Almighty to connect in a myſterious manner with certain natural ſubſtances.

The ſubſequent hiſtory of diſcoveries reſpecting the diamond, relates for the moſt part to its combuſtibility; and theſe the reader will find ſufficiently detailed in the article Carbon. We ſhall therefore proceed to the deſcription of this gem, according to the moſt accurate modern writers on the ſubject.

The diamond is either colourleſs, or of a light yellow, or ſmoke-grey paſſing into bluiſh, or pearl-grey, or clear wine-colour; on one hand deepening into clove-brown, and on the other into yellowiſh-green: it alſo occurs of a deep, almoſt black brown, Pruſſian blue, or roſe red. The colourleſs varieties are the moſt eſteemed, and next to theſe in value are the blue, red and black; the light coloured are the leaſt in eſtimation.

It is found cryſtallized in the regular octohedron (which is its primitive form) compoſed of two four ſided pyramids, applied baſe to baſe, or in the cuneiform octohedron. Sometimes each triangular face of the primitive octohedron is replaced by ſix ſecondary triangles, bounded by curvilinear lines; in which caſe the whole cryſtal has forty eight faces, and is of a ſpheroidal figure. Other ſpheroidal varieties of this mineral are the dodecahedron, a ſolid of twenty-four faces, and a compreſſed ſpheroid reſembling a very ſhort hexahedral priſm, terminated by very ſhort curvilinear pyramids.

 The

The ſurface of the natural cryſtals, eſpecially the ſpheroidal, is ſomewhat dull and chatoyant. This appearance, which is generally repreſented as the effect of a thin cruſt, appears to be cauſed merely by the ſaliant edges of the laminæ of which the cryſtal conſiſts. When its ſurfaces are reduced to perfect ſmoothneſs by grinding and poliſhing, the diamond is of extreme brilliancy, far ſurpaſſing every other ſubſtance in luſtre, and the lively play of priſmatic colours, which dart from it in lines of light, whenever its poſition, with regard to the eye, undergoes the leaſt variation. The fracture of the diamond is ſtraight foliated; hence it may readily be cleft in the direction of its lamellæ by a dextrous artiſt. Some of the ſpheroidal varieties, however, are compoſed of curved plates; theſe are of intenſe hardneſs, and cannot be either ſplit, or very highly poliſhed; they are therefore uſed by the glaziers and engravers on gems, or are ground into a powder, and employed in the poliſhing of other diamonds.

The hardneſs of this gem is ſuperior to that of all other bodies; it yields however to corundum by long-continued friction. It is brittle and frangible without much difficulty. Its ſp. gr. varies from 3.518 to 3.550.

Diamond, even when rough, acquires by friction the vitreous or poſitive electricity. It becomes phoſphoreſcent when expoſed either to the entire rays of the ſun, or to the blue ones alone, when ſeparated by the priſm, and concentrated on the diamond by means of a lens. A ſimilar effect is alſo produced by fixing it to the end of a charged conductor, and taking a few electric ſparks from it. Many diamonds, however, are incapable of becoming phoſphoreſcent, although agreeing in colour, tranſparency, &c. with thoſe which readily become luminous. The ſmaller acquire this property by a much ſhorter expoſure to the light, than the larger ones do; ſometimes a diamond that is not phoſphoreſcent, by the mere action of the ſolar rays, may be made ſo, by previouſly immerſing it for ſome time in melted borax. See Groſſer in Journ. de Phyſique, vol. xx. p. 270.

Diamond, when heated to the temperature of melting copper, and expoſed to a current of air, is gradually, but completely combuſtible; it is ſurrounded by a luminous areola during the proceſs. It is wholly converted into carbonic acid, and therefore conſiſts of pure carbon, as we have already mentioned under that article.

The art of cutting and poliſhing diamonds was probably known to the artiſts of Hindooſtan and China at a very early period: but the only material uſed in the Eaſt for this purpoſe being corundum, and the apparatus being of extreme ſimplicity, the jewellers of theſe countries are incapable of bringing out the peculiar beauty of the diamond in a degree at all comparable to what is readily effected by European artiſts. The extreme hardneſs of this gem had baffled the attempts of the jewellers of Europe till the year 1456, when a young man, named Louis Berghen, a native of Bruges, endeavoured to poliſh two diamonds, by rubbing them againſt each other: he found that by this means a facet was produced on the ſurface of the diamonds, and in conſequence of this hint, conſtructed a poliſhing wheel, on which, by means of diamond powder, he was enabled to cut and poliſh this ſubſtance, in the ſame way as other gems are wrought by emery. Previouſly to this diſcovery, diamonds were ſet in jewellery, preciſely in the ſtate in which they arrived from India, and hence the octohedrons were much more eſteemed than the reſt, both on account of the regularity of their figure and the ſuperiority of their poliſh.

On the ſubject of the manufacture of diamonds, we ſhall ſtate the following particulars, on the authority of Jeffries's treatiſe of Diamonds.

Diamonds are cut and manufactured by jewellers into brilliants and roſe diamonds; the former being for the moſt part made out of the octohedral cryſtals, and the latter from the ſpheroidal varieties. To faſhion a rough diamond into a brilliant, the firſt ſtep is to modify the faces of the original octohedron, ſo that the plane formed by the junction of the two pyramids ſhall be an exact ſquare, and the axis of the cryſtal preciſely twice the length of one of the ſides of the ſquare. The octohedron being thus rectified, a ſection is to be made, parallel to the common baſe, or *girdle*, ſo as to cut off $\frac{5}{18}$ths of the whole height from the upper pyramid, and $\frac{1}{18}$th from the lower one. The ſuperior and larger plane, thus produced, is called the *table*, and the inferior and ſmaller one is named the *collet*: in this ſtate it is called a *compleat ſquare table diamond*. To convert it into a brilliant, two triangular facets are placed on each ſide of the table, thus changing it from a ſquare to an octagon; a lozenge-ſhaped facet is alſo placed at each of the four corners of the table, and another lozenge extending lengthways along the whole of each ſide of the original ſquare of the table, which, with two triangular facets ſet on the baſe of each lozenge, compleats the whole number of facets on the table-ſide of the diamond: *viz.* eight lozenges and twenty-four triangles. On the collet-ſide are formed four irregular pentagons, alternating with as many irregular lozenges radiating from the collet as a centre, and bordered by ſixteen triangular facets adjoining the girdle. The brilliant, being thus compleated, is ſet with the table-ſide upwards, and the collet-ſide implanted in the cavity made to receive the diamond.

The regular roſe diamond is formed by inſcribing a regular octagon in the centre of the table-ſide of the ſtone, and bordering it by eight right-angled triangles, the baſes of which correſpond with the ſides of the octagon; beyond theſe is a chain of eight trapeziums, and another of ſixteen triangles. The collet-ſide alſo conſiſts of a minute central octagon, from every angle of which proceeds a ray to the edge of the girdle, forming the whole ſurface into eight trapeziums, each of which is again ſub-divided by a ſaliant angle (the apex of which touches the girdle,) into one irregular pentagon, and two triangles.

In the formation of either a brilliant or roſe-diamond of regular proportions, ſo much is cut away, that the weight of the poliſhed gem is no more than half that of the rough cryſtal out of which it was formed; whence the value of a cut diamond is eſteemed equal to that of a ſimilar rough diamond of twice the weight, excluſive of the coſt of the workmanſhip. The weight, and conſequently the value, of diamonds, is eſtimated in carats; one of which is equal to four grains, and the difference between the price of one diamond and another, *ceteris paribus*, is as the ſquares of their reſpective weights. Thus the value of three diamonds of one, two, and three carats' weight reſpectively, is as one, four, and nine. The average price of rough diamonds, that are worth working, is about 2*l.* ſterling for the firſt carat, and conſequently in wrought diamonds, excluſive of the coſt of workmanſhip, the coſt of the firſt carat is 8*l.* In other words, in order to eſtimate the value of a wrought diamond, aſcertain its weight in carats, and fractions of a carat, multiply this by two, then multiply this laſt product into itſelf, and finally multiply this latter ſum by 2*l.* Hence a wrought diamond of

1	Carat, is worth	£8
2	- - -	32
3	- - -	72
4	- - -	128
5	- - -	200
6	- - -	288

 7 Carats

7 Carats are worth			£392
8	-	-	- 512
9	-	-	- 612
10	-	-	- 800
20	-	-	3,200
30	-	-	7,200
40	-	-	12,800
50	-	.	20,000
60	-	-	28,800
70	-	-	39,200
80	-	-	51,200
90	-	.	64,800
100	-	.	80,000

This rule, however, actually holds good only in the ſmaller diamonds of 20 carats, and under; the larger ones, in conſequence of the ſcarcity of purchaſers, being diſpoſed of at prices greatly inferior to their eſtimated worth. The value of ſome of the moſt perfect diamonds exceeds that given in the table; but for a ſtone that is flawed, cloudy, or of a bad colour, ſometimes three quarters of the whole tabular value muſt be deducted.

We now proceed to enumerate ſome of the moſt remarkable diamonds, and at the head of the liſt ought unqueſtionably to be placed the great diamond of Portugal, if it were not now become the general opinion, both of jewellers and mineralogiſts, that this ſuppoſed diamond is only a colourleſs topaz. It was found in the diamond mines of Brazil, and is as yet in its native rough ſtate; it weighs 1680 carats.

The largeſt, therefore, of all the undoubted diamonds, is that mentioned by Tavernier, as in the poſſeſſion of the great Mogul; its weight, according to the ſame author, (who himſelf weighed it,) is $279\frac{9}{16}$ carats: its form and ſize are equal to about half a hen's egg. It was found in the mine of Colore, to the eaſt of Golconda, about the year 1550.

The next in ſize is a Brazilian diamond, in poſſeſſion of the king of Portugal, weighing 215 carats, and of ſingular beauty.

An oriental diamond, formerly belonging to one of the Perſian ſultans, and at preſent in poſſeſſion of the emperor of Ruſſia, deſerves the next place: it is without flaws or faults of any kind, and weighs 193 carats. It was purchaſed by the late empreſs Catherine, for about 90,000*l.* ready money, and an annuity of about 4000*l.* more. Its form is that of a flattened ovoid, and it is about the ſize of a pigeon's egg.

The laſt that deſerves a place among the great diamonds of the world, is the Pitt, or regent diamond; which was brought over from India by an Engliſh gentleman of the name of Pitt, and was ſold by him to the regent duke of Orleans, by whom it was placed among the crown jewels of France, and of which it ſtill forms the great glory. It is cut in the form of a brilliant, and is abſolutely faultleſs; it weighs $136\frac{4}{16}$ carats, and was purchaſed for about 100,000*l.*

Diamonds were much more rare, and of courſe dearer, before the diſcovery of the Brazilian mines of this ſubſtance, than they have been ſince. In the year 1730, the Rio Janeiro fleet brought to Europe no leſs than 1146 ounces of diamonds, the produce of Brazil; in conſequence of which, the price of this article immediately fell three-fourths, and to prevent a ſtill further depreciation, the Portugueſe government reſtricted the number of ſlaves allowed to be employed by thoſe to whom leaſes of theſe mines had been granted.

In order to enable the reader to form ſome judgment of the quantity and value of the diamonds poſſeſſed by the ſovereigns of Europe, we ſhall preſent him with an abſtract of a curious inventory of the crown diamonds of France, preſented to the National Aſſembly by a commiſſion of jewellers, appointed for that purpoſe in the year 1791.

	Weight in Carats.	Eſtimated Value in Livres.
1. A brilliant diamond, called *Le Regent* - -	$136\frac{14}{16}$	12,000,000
2. A diamond cut in facets, called *Le Sancy*, perfect in luſtre and tranſparency -	$33\frac{12}{16}$	1,000 000
3. A diamond cut in facets -	$28\frac{6}{16}$	250,000
4. A brilliant diamond -	$26\frac{12}{16}$	150,000
5. A pear-ſhaped diamond, of a peach-bloſſom colour -	$24\frac{13}{16}$	200,000
6. Le Miroir de Portugal -	$21\frac{2}{16}$	250,000
7. A yellowiſh pear-ſhaped diamond - - -	$20\frac{14}{16}$	65,000
8. A roſe-coloured brilliant, flawed	$20\frac{12}{16}$	48,000
9. A colourleſs olive-ſhaped diamond	$18\frac{13}{16}$	85,000
10. A greeniſh brilliant, flawed	$18\frac{11}{16}$	20,000
11. A pale wine-coloured brilliant	$18\frac{9}{16}$	75,000
12. A ſteel-coloured brilliant	$17\frac{7}{16}$	18,000
13. A brilliant, cloudy -	17	50,000
14. Le dizieme Mazarin, cloudy	16	50,000
15. A peach bloſſom-coloured brilliant	$14\frac{14}{16}$	25,000
16. A colourleſs brilliant -	$14\frac{14}{16}$	150,000
17. A peach bloſſom-coloured brilliant	$14\frac{12}{16}$	30,000
18. A brilliant - -	$13\frac{10}{16}$	60,000
19. A browniſh brilliant -	$13\frac{8}{16}$	35,000
20. A yellowiſh brilliant -	$11\frac{10}{16}$	15,000
21. A browniſh brilliant - -	$11\frac{10}{16}$	10,000
22. A yellowiſh brilliant -	$11\frac{6}{16}$	15.000
23. A peach-bloſſom coloured brilliant	$11\frac{2}{16}$	10,000
24. A pale blue brilliant -	$10\frac{7}{16}$	30,000
25. A browniſh brilliant - -	$10\frac{4}{16}$	25,000
26. A colourleſs brilliant -	10	30,000
27. 15 brilliants, weight unknown, eſtimated at - - -		833,000
28. 54 brilliants, weighing from five to leſs than ten carats each		756,000
29. 227 brilliants, weighing from one to leſs than five carats each		332,700
30. 1631 ſmall diamonds, weighing in all - - -	425	77,228
31. 12 diamonds, chiefly roſe diamonds, and flawed -	84	82,700
Royal State Dreſs, *Parure blanche.*		
32. 12 brilliants, weighing from two to 20 carats each, and 163 ſmaller - - -		413,000
33. Plaque de l'ordre du Saint Eſprit, 9 brilliants from 7 to 14 carats each, and 286 ſmaller ones - - -		324,000
34. Epaulette, 12 brilliants from 3 to 19 carats each, -		306,000
35. Croix du cordon, 6 large brilliants, and 143 ſmaller -		200,000
Parure de Couleur.		
36. A rich ſky-blue brilliant -	$67\frac{2}{16}$	3,000,000
37. A pale blue brilliant -	$31\frac{12}{16}$	300,000
38. Croix du cordon, 13 larger brilliants, 362 ſmaller - -		10,000
39. Epaulette, 9 larger brilliants, 197 ſmaller - - -		47,000

40. Epée

	Weight in Carats.	Eſtabliſhed Value in Livres.
40. Epée de diamans, 2189 roſe diamonds - -	400	329,075
41. Diamond buttons, larger brilliants	112	294,851
——— ſmaller do.	440	
42. Sundry other diamonds of various qualities - -		315,000

The principal uſe of diamond is in ornamental jewellery: it is alſo employed by glaziers for cutting glaſs; by lapidaries for cutting and engraving upon the hardeſt gems, and in the finer kinds of clock-work.

The mineralogical ſituation of the diamond is not very well aſcertained. It occurs in India, in detached cryſtals, in a kind of indurated ochery gravel, not far from the ſurface of the ground; but whether or not this is its native bed is unknown. The diamond mines of India extend throughout the whole chain of the Ghauts, from Bengal to cape Comorin: many of theſe, however, are at preſent abandoned, the chief that are now worked being ſituated between Golconda and Maſulipatam. The earth which affords them being dug up and broken to pieces, is carefully waſhed till the water comes off colourleſs; the reſidue is then ſpread thin on mats in the ſun, and the diamonds are diſcovered by their ſuperior brilliancy. This valuable gem is alſo found in Borneo and in Brazil: the diamonds of this latter country are procured in the mountainous diſtrict called Serro do Frio, and are contained in alluvial beds of ferruginous ſand.

Diamonds have been found in the Eaſt Indies, principally in the kingdoms of Golconda, Viſapour, Bengal, and the iſland of Borneo. There are four mines, or rather, two mines and two rivers, whence diamonds have been drawn. The mines are, 1. That of Raolconda, in the province of the Carnatic, 17 gos, of four French leagues each, from Golconda, and about 13 gos from Viſapour. It has been diſcovered about 250 years. (See RAOLCONDA.) 2. That of Gani, or Colore, ſituated on the ſouthern bank of the Kiſtnah, and not far from Condavir. It was diſcovered about 170 years ago by a peaſant; who, digging in the ground, found a natural fragment of twenty-five carats. 3. That of Sumbulpour, a large town in the kingdom of Bengal, near the diamond mine; this is the moſt ancient of them all. It ſhould rather be called that of Goual, which is the name of the river, in the ſand whereof theſe ſtones are found. Laſtly, the fourth mine, or rather the ſecond river, is that of Succudan, in the iſland of Borneo. There are alſo the famous diamond mine of Bundelcund, at Panna, or Purna, 165 geographical miles from Bilſah; another at Beiragur, near the Mahanuddy river, and not far from that of Sumbulpour, which is of more modern date than the other; and another near Gandicotta, on the ſouth bank of the Pennar river.

DIAMOND-*mine of Raolconda.*—In the neighbourhood of this mine the earth is ſandy, and full of rocks and copſe: in theſe rocks are found ſeveral little veins, of half, and ſometimes a whole inch broad, out of which the miners, with a kind of hooked irons, draw the ſand, or earth, wherein the diamonds are; breaking the rocks when the vein terminates, that the track may be found again, and continued. When a ſufficient quantity of earth, or ſand, is drawn forth, they waſh it two or three times, to ſeparate the ſtones therefrom: the miners work quite naked, except for a thin linen cloth before them; and, beſides this precaution, they have likewiſe inſpectors, to prevent their concealing of ſtones: which, however, in ſpite of all their care, they frequently find means to do, by watching opportunities, when they are not obſerved, and ſwallowing them down.

DIAMOND-*mine of Gani,* or *Colore.*—In this mine are found a great number of ſtones, from ten to forty carats, and even more; and it was there that the famous diamond of Aurengzebe, the great mogul, which, before it was cut, weighed 793 carats, was found. The ſtones of this mine are not very clear; their water is uſually tinged with the quality of the ſoil; being black, where that is marſhy; red, where it partakes of red; and ſometimes green and yellow, if the ground happen to be of thoſe colours. Another defect, of ſome conſequence, is a kind of greaſineſs appearing on theſe diamonds, when cut, which takes off part of their luſtre. There are uſually no leſs than ſixty thouſand perſons, men, women, and children, at work in this mine.

When the miners have found a place where they intend to dig, they level another, ſomewhat bigger, in the neighbourhood thereof, and encloſe it with walls about two feet high, only leaving apertures, from ſpace to ſpace, to give paſſage to the water: after a few ſuperſtitious ceremonies, and a kind of feaſt, which the maſter of the mine makes for the workmen, to encourage them, every one goes to his buſineſs, the men digging the earth in the place firſt diſcovered, and the women and children carrying it off into the other, walled round. They dig twelve or fourteen feet deep, and till ſuch time as they find water; then they ceaſe digging: and the water, thus found, ſerves to waſh the earth two or three times; after which, it is let out at an aperture reſerved for that purpoſe. This earth being well waſhed, and well dried, they ſift it in a kind of open ſieve, or riddle, much as we do corn in Europe; then they thraſh it, and ſift it afreſh; and, laſtly, they ſearch it well with the hands, to find the diamonds. They work naked here, as in the mineof Raolconda, and are watched, after the like manner, by inſpectors.

DIAMOND-*mine of Sumbulpour,* or *river Goual.*—Sumbulpour is a large town built all of earth, and covered with branches of cacao-tree: the river Goual runs by the foot thereof, in its paſſing from the high mountains, towards the ſouth to the Ganges, where it loſes its name. It is from this river that are brought all our fine diamond-points, or ſparks, called natural ſparks. They never begin to ſeek for diamonds in this river till after the great rains are over, that is, after the month of December; and they uſually even wait till the water is grown clear, which is not before January: the ſeaſon at hand, eight or ten thouſand perſons, of all ages, and both ſexes, come out of Sumbulpour, and the neighbouring villages. The moſt experienced among them ſearch and examine the ſand of the river; going up it from Sumbulpour to the very mountain whence it ſprings. A great ſign that there are diamonds near, is, the finding of thoſe ſtones which we Europeans call thunder-ſtones. When all the ſand of the river, which at that time is very low, has been well examined, they proceed to take up that wherein they judge diamonds likely to be found; which is done after the following manner: they dam the place round with ſtones, earth, and faſcines: and, lading out the water, dig about two feet deep: the ſand, thus got, is carried into a place walled round on the bank of the river. The reſt is performed after the ſame manner as at Colore, and the workmen are watched with equal ſtrictneſs.

DIAMOND-*mine in the iſland of Borneo,* or *river of Succudan.* We are but little acquainted with this mine; the prince who reigns in that part of the iſland not allowing ſtrangers to have any commerce in theſe ſtones: though there are very fine ones to be bought at Batavia, brought thither by ſtealth. They were anciently imagined to be ſofter than thoſe of the other mines; but experience ſhews, they are in no reſpect inferior to them.

Diamond mines were diſcovered about the year 1728, in the Brazils belonging to the king of Portugal, who, in the year 1740, let them to a company at Rio Janeiro, for a certain ſtipulated annual rent, which is ſaid to be 130,000 cruſades, on

on condition that the ſaid company employ no more than 600 ſlaves in working them; ſince which time the value of diamonds is diminiſhed.

The factitious diamonds made in France, called temple diamonds, on account of the temple at Paris, where the beſt of them are made, fall vaſtly ſhort of the genuine ones; accordingly, they are but little valued, though the conſumption thereof is pretty conſiderable for the habits of the actors on the ſtage, &c. See PASTES.

DIAMONDS, *Corniſh*, in *Natural Hiſtory*, a name given in England to all the ſpecies of cryſtals, which are compoſed of a column, terminated at each end by a pyramid. The name takes in two genera of cryſtal, of each of which there are ſeveral ſpecies. Dr. Hill has determined this to be the true figure of perfect cryſtal, and accounts all thoſe which are affixed by one end to ſome ſolid body, and terminated at the other by a pyramid, to be mutilated or imperfect cryſtals. The ſame author, according to the length or thickneſs of the intermediate column, has divided theſe bodies into two genera, the firſt the macroteloſtyla, the other the brachyteloſtyla. See MACROTELOSTYLA and BRACHYTELOSTYLA.

DIAMOND is an inſtrument of conſiderable uſe in the glaſs manufactory, for ſquaring the large plates, or pieces; and among glaziers for cutting their glaſs.

Theſe diamonds are differently fitted up. That uſed for looking-glaſſes, and other large pieces, is ſet in an iron ferril two inches long, and a quarter of an inch in diameter. The reſt of the cavity of the ferril is filled with melted lead, which keeps the diamond firm in its place. The glaziers have a handle of box, or ebony, fitted into the ferril to hold it by. In the former there is a little piece of box croſſing the ferril, in form of a little plane, covered at bottom with a thin copper-plate.

DIAMOND, in *Geography*, a ſmall iſland of the Weſt Indies, near the S.W. coaſt of the iſland of Martinico; half a league S. of cape Diamond.—Alſo, a ſmall iſland in the bay of Bengal, near the S.W. coaſt of Ava. N. lat. 15° 50′. E. long. 94° 30′.

DIAMOND *Point*, a cape on the north coaſt of the iſland of Sumatra, in the ſtrait of Malacca. N. lat 5° 20′. E. long. 97° 52′.

DIAMOND, in *Heraldry*, is uſed to expreſs the black colour in the atchievements of noblemen.

Guillim diſlikes the way of blazoning the coats of peers by precious ſtones, inſtead of metals, or colour. But the Engliſh practice allows it. See COLOUR.

DIAMOND-*cutter*. See LAPIDARY.

DIAMOND-*glaſs*. See GLASS.

DIAMOND-*powder* is of great uſe for grinding hard ſubſtances. And Mr. Boyle obſerves, that though it be much dearer than emery, yet it makes ſo great diſpatch, and the tools employed laſt ſo much longer, as greatly to overbalance the cheapneſs of the emery.

DIAMORUM, of the *Old Diſpenſatories*, is ſyrup of mulberries.

DIAMPER, or UDEAMPER, in *Geography*, a town of India, in the country of Cochin, ſaid to be inhabited by Chriſtians of St. Thomas; 15 miles W. of Cochin. N. lat. 9° 57′. E. long. 76° 21′.

DIAMUNA, in *Ancient Geography*, a name given by Ptolemy to a river of India, which ran into the Ganges.

DIAN BEL, in *Geography*, a town of the iſland of Madagaſcar; about 130 miles E. of Carembole.

DIAN *Dane*, a town of Madagaſcar, on the N. ſide of the river Yonghelahe, under the tropic of Capricorn, N. of cape St. Auguſtine.

DIAN *Katzambe*, a town of Madagaſcar; about 30 miles S. of cape St. Auguſtine.

DIAN *Mahe*, a town of Madagaſcar; 130 miles N. of Carembole.—Alſo, a town of the ſame name, on the ſouth ſide of the river Yonghelahe, near cape St. Auguſtine.

DIAN *Manarghon*, a town of Madagaſcar, on the E. ſide of the river Ronnumina; 130 miles N.E. of cape St. Auguſtine.

DIAN *Manaſſa*, a town of Madagaſcar, on the N. bank of the river Yonghelahe; about 100 miles N.E. of cape St. Auguſtine.

DIAN *Maſſo*, a town of Madagaſcar, in the ſouthern diſtrict; about 100 miles N.E. of Carembole.

DIAN *Manauove*, a town of Madagaſcar; about 70 miles N.E. of Carembole.

DIAN *Miſſon*, a town of Madagaſcar; about 80 miles N.E. of Carembole.

DIAN *Raholt*, a town of Madagaſcar; 140 miles N.N.E. of Carembole.

DIAN *Raval*, a town of Madagaſcar; 160 miles N.N.E of Carembole.—Alſo, another town of the ſame name, near the ſource of the river Manhouve; about 80 miles N.N.E. of Carembole.

DIAN *Siandrin*, a town of Madagaſcar, 70 miles E. of Carembole.

DIAN *Simamande*, a town of Madagaſcar, near the W. bank of the river Menerandre; about 68 miles N.W. of Carembole.

DIAN *Soreets*, a town of Madagaſcar; 130 miles N.E. of Carembole.

DIANA, in *Ancient Geography*, *Zainah*, a town of Africa, ſituated in the mountains of Mauritania Sitifenſis, where, among other ruins, is found that of a triumphal arch, ſuſtained by two columns of the Corinthian order.

DIANA, in *Mythology*, the daughter of Jupiter and Latona, and twin ſiſter to Apollo. She is ſaid to have been born firſt, and to have aſſiſted her mother in the delivery of Apollo. The ſuffering of Latona on this occaſion, gave Diana an averſion to marriage, though not to gallantry. She is accuſed of having loved and beſtowed her favours on Endymion, Pan, and Priapus. She was the goddeſs of the woods on earth, Luna in heaven, and Hecate in hell. She was the ſame with Iſis, who is the moſt ancient Diana of all. The Greeks, deriving their theology from the Egyptians, adjuſted it to their own ideas, and attributed to the ſiſter of Apollo what they ſaid of the ſiſter of Oſiris.

The moſt known character of this goddeſs is that of her preſiding over woods, and delighting in hunting. Accordingly the Diana venatrix, or goddeſs of the chace, is frequently repreſented in ancient ſtatues; and deſcribed by the Roman poets, as running, with her veſt ſhortened and girt about her, and yet flying back with the wind: ſhe is tall of ſtature; and her face, though ſo very handſome, is ſomewhat manly: her legs are bare, well-ſhaped, and ſtrong: her feet are ſometimes bare, and ſometimes adorned with a ſort of buſkin: ſhe often has her quiver on her ſhoulder: and ſometimes holds a javelin, but more uſually her bow in her right hand. The ſtatues of Diana were frequent in the woods, where ſhe is repreſented as hunting, bathing, and reſting herſelf after fatigue. Diana has been ſometimes repreſented with three bodies, and hence called the triple, three-headed, and three bodied Diana. Hence the name of *Triformis* given her by the poets (Horace, Virgil, Martial, &c.) and the cuſtom of repreſenting her with three heads, one of which on the right was that of a horſe, one on the left that of a dog, and one in the middle that of a boar. Thus Virgil deſcribes her. (Æn. iv.):

" Ter-

"Tergiminamque Hecatem, tria virginis ora Dianæ."

Paufanias, however, obferves (in Corin. c. 30.) that this cuftom was neither univerfal nor very ancient. Her diftinguifhing name, under this triple appearance, is Hecate or Trivia; under which character of the infernal Diana fhe was invoked in enchantments,, and reprefented as a Fury, holding inftruments of terror in her hands, and grafping cords, fwords, ferpents, or flaming torches. When fhe is reprefented as the intelligencer that prefides over the moon, fhe appears in a car, drawn by ftags, or by does, but more commonly by horfes of a perfectly white colour, with a lunar crown or crefcent on her forehead.

Diana's love of chaftity induced the Greeks to give her virgins for her companions. Although fhe is ordinarily reprefented with a quiver and dogs, drawn in a chariot by two white ftags: fhe is fometimes figured with wings, as we learn from Paufanias, having in one hand a lion and in the other a panther, her chariot being drawn either by two heifers, or by two horfes of different colours, but this author owns that he does not underftand the meaning of thefe fymbols.

When Diana reprefented the moon, fhe was called *Lucina*; and alfo when fhe was invoked by women in child-bed, fhe bore the fame appellation, and alfo that of *Juno Pronuba*. She had alfo feveral other names; fuch as that of *Trivia*, from her triform figure, and alfo importing that fhe was worfhipped in the crofs ways, the ftreets, and public roads, where her ftatues were commonly erected. She was alfo called *Orthia*, either from a place, denominated Orthione in Arcadia, where fhe was worfhipped, or rather from the feverity with which fhe punifhed thofe of her companions who did not maintain ftrict chaftity, or becaufe the youths of Lacedæmon performed the ceremony of *diamaftigofis*, (which fee) before her ftatues: The name *Orthion* being given by the Greeks to one that was obdurate and inflexible. The names of *Militta*, *Alilat*, and *Anaitis*, were given to her by the Phœnicians, Arabians, and Cappadocians. The appellation of *Deviana* had its rife from her being fond of hunting, as thofe who were addicted to this exercife were apt to lofe themfelves, or to deviate. Spon (Mifc. Erud. Ant.) is the firft who has given a print of a monument, where Diana is named *Clatra*. This goddefs is there reprefented with Apollo, both charged with fymbols, Apollo with his lyre, holds in his hand Jupiter's thunder, and has his head encircled with rays, and above, the fun. In a circle Diana has upon her head the crefcent, a turret, and a pine-apple, like Cybele, a ferpent wreathed about her arm, as Hygeia the goddefs of health, the Siftrum of Ifis, a prow of a fhip, like Ifis furnamed Pelagia. This is evidently Diana, becaufe fhe reprefents the moon, that is, an Ifis, after the manner of the Greeks. The other names of this goddefs are moftly derived from the places where fhe was worfhipped. Diana is eafily known in the figures that reprefent her, either by the crefcent upon her head, or by her bow and arrows, or by her hunting habit, or by the dogs that accompany her. The Diana of Ephefus was reprefented with a great number of beafts, and with other fymbols that fignified the earth and Cybele, or rather nature herfelf, whom that goddefs reprefented. She is fupported by a couple of deer, and bears on her head a pannier of fruit. Thus the Ephefian Diana is commonly exhibited upon Greek imperial coins. Her buft is known by the crefcent on her brow, and fometimes by the bow, or quiver, engraven on one fide.

Diana had many oracles, in Egypt, in Cilicia, at Ephefus, and many others. She had alfo many temples dedicated to her, of which that at Ephefus was the moft celebrated, and efteemed one of the feven wonders of the world, on account of its ftructure, fize, and furniture. This magnificent edifice, built at the common charge of all the ftates in Afia, was fituated at the foot of a mountain, and at the head of a marfh, which place was chofen, according to Pliny, as being the leaft fubject to earthquakes. But it was neceffary, at a very great expence, to make drains for conveying the water that came down the hill into the morafs and the Cayfter. Philo Byzantius informs us, that, in this work, fuch a quantity of ftone was ufed, as almoft exhaufted all the quarries in the country; and thefe drains or vaults are what the prefent inhabitants take for a labyrinth. In order to fecure the foundation of the conduits or fewers, which were to bear the weight of this immenfe building, they laid beds of charcoal, fays Pliny, well rammed, and upon them others of wool Two ancient authors have left us fome account of the conftruction of this temple; Vitruvius and Pliny. The firft tells us that it had eight columns in the fore-front and as many in the back-front; that it had a double range of columns round it; and that it was of the Ionic order; which order, he fays, was firft made of eight diameters high. Pliny fays, (lib. xxxvi. cap. 14.) that 220 years elapfed during its conftruction; that it was 425 feet in length, and 220 in breadth; that it was adorned with 100 columns, each 60 feet high; that 27 were the gifts of fo many kings; that 36 were enriched with fculpture, &c. The original paffage, with a correction in the punctuation, is as follows: "Univerfo templo longitudo eft ccccxxv pedum, latitudo ducentorum viginti, columnæ centum, viginti feptem a fingulis regibus factæ, fexaginta pedum altitudine: ex his triginta fex cœlatæ, &c." In the paffage, as it is in the original, there is no comma after *centum*; and accordingly it feems to intimate, that in the porticoes of this temple were 127 columns, the gift of fo many kings. Mr. Wyndham (Archæologia, vol. vi. No. 6.) fays, that this is totally repugnant to the fymmetry and proportion obferved by the ancients in the form of their temples; and farther, that it can hardly be fuppofed, that 127 Afiatic kings fhould have contributed each a column. He therefore propofes the above emendation, which removes the difficulty. If we then fuppofe thefe columns to have been of eight diameters, the diameter muft have been feven feet fix inches. The columns, therefore, with their intercolumnar fpaces, and the ten fteps by which they afcended to the level of the portico, will very completely fill up the extent of front mentioned by Pliny; and if we fuppofe 17 columns in the flank, it will, in like manner, fill up Pliny's length of the temple; and thus it will be eafy to account for the 100 columns which that writer has affigned to this building. Of thefe columns 27 were very curioufly carved, and the reft polifhed. The architect, employed on this occafion, was Ctefiphon or Ctefifonte (fee CTESIFONTE), called by Pliny and Strabo Cherfiphron; and the baf reliefs of one of the columns were executed by Scopas, the moft famous fculptor of antiquity. The altar was adorned with the mafterly fculptures of Praxiteles, who had, perhaps, felected from the favourite legends of the place the birth of the divine children of Latona, the concealment of Apollo after the flaughter of the Cyclops, and the clemency of Bacchus to the vanquifhed Amazons. Neverthelefs, this temple, though fuperior to the cathedral of St. Paul at London, is confeffedly inferior to the church of St. Peter's at Rome. The length of the Ephefian temple was 425 feet, and that of St. Peter's church 840 Roman palms, each palm being very little fhort of nine Englifh inches: and, therefore, the length of the former was about two-thirds of the meafure of the latter. In other dimenfions, it was ftill more inferior to that fublime production of modern architecture. However, fucceffive emperors, the Perfian, the Macedonian, and the Roman, have revered its fanc-

tity,

tity, and enriched its fplendour. This temple enjoyed the privilege of an afylum, which at firft extended to a furlong, was afterwards enlarged by Mithridates to a bow-fhot, and doubled by Marc Antony, fo that it took in part of the city; but Tiberius, in order to terminate the many abufes and diforders that attended privileges of this kind, revoked them all, and declared, that no man, guilty of any wicked or difhoneft action, fhould efcape juftice, though he fled to the altar itfelf.

The priefts, who officiated in this temple, were held in great efteem, and trufted with the care of facred virgins or priefteffes, but not till they were made eunuchs. They were called Eftiatores and Effenæ, had a particular diet, and were not allowed, by their conftitutions, to go into any private houfe. They were maintained with the profits accruing from the lake Selinufius, and another that fell into it, which muft have been very confiderable, fince they erected a golden ftatue to one Artemidorus, who, being fent to Rome, recovered them after they had been feized by the farmers of the public revenues. All the Ionians reforted yearly to Ephefus with their wives and children, where they folemnized the feftival of Diana with great pomp and magnificence: making, on that occafion, rich offerings to the goddefs, and valuable prefents to her priefts. The Afiarchæ, mentioned by St. Luke, (Acts, xvi.) were, according to Beza, thofe priefts whofe peculiar province it was to regulate the public fports that were annually performed at Ephefus, in honour of Diana: they were maintained with the collections made during the fports; for all Afia flocked to fee them. The "great Diana of the Ephefians," as fhe was ftyled by her blind adorers, was, according to Pliny, a fmall ftatue of ebony, made by one Canitia, though commonly believed to have been fent down from heaven by Jupiter. This ftatue was at firft placed in a nich, which, as we are told, the Amazons caufed to be made in the trunk of an elm. Such was the firft rife of the veneration that was paid to Diana in this place. In procefs of time, the veneration for the goddefs daily increafing among the inhabitants of Afia, a moft ftately and magnificent temple was built near the place where the elm ftood, and the ftatue of the goddefs placed in it. This was the firft temple, but not quite fo fumptuous as that which we have above defcribed, though reckoned, as well as the fecond, among the wonders of the world. The fecond was remaining in Pliny's time, and in Strabo's; and is fuppofed to have been deftroyed in the reign of Conftantine, purfuant to the edict by which that emperor commanded all the temples of the heathens to be demolifhed: the former was burnt on the day when Alexander was born, by one Eroftratus, who owned on the rack, that the only motive which prompted him to deftroy fo noble a ftructure, was the defire of tranfmitting his name to future ages. The ftates general of Afia imagined they fhould prevent the accomplifhment of his intention, by publifhing a decree, prohibiting the mention of his name. However, their prohibition only excited a greater curiofity; for fcarcely one of the hiftorians of that age has omitted to mention fo extravagant an act, and to announce the name of the criminal. Alexander the Great offered to rebuild the temple at his own expence, provided that the Ephefians would agree to infcribe his name on the front; but they rejected this offer in a manner that prevented the refentment of that vain and ambitious prince, telling him, that "it was not fit one god fhould build a temple to another." The pillars, and other materials that had been faved out of the flames, were fold, and alfo the jewels of the Ephefian women, who, on this occafion, willingly parted with them; and the fum thus raifed ferved for the carrying on of the work till other contributions came in, which, in a fhort time, amounted to an immenfe treafure. The architect who fuperintended the conftruction of this edifice was Dinocrates. This is the temple of which Strabo, Pliny, and other Roman writers have given an account. It ftood between the city and the port, and was built, or rather finifhed, as Livy tells us, (lib. i. c. 45,) in the reign of king Servius. This temple, after having rifen with increafing fplendour from feven repeated misfortunes, was finally burnt by the Goths, in their third naval invafion, A.D. 260.

It appears, on undoubted evidence, that in England the common people, in ancient times, not only feared Diana as a witch, but that they had on many occafions paid her reverential honours as a goddefs. That Diana was worfhipped in Gaul, we learn from Polyænus, (lib. viii. Stratag. c. 39.); and in proof of her having been worfhipped likewife in Britain, Mr. Sammes (Antiq. of Britain, p. 135.) takes notice of an image which, in the year 1602, was dug out of the ground in Monmouthfhire, that, both by the form and drefs, as likewife by an infcription found not far from it, appeared to be the figure of that goddefs. And Mr. Camden thinks it not improbable, that there was anciently a temple of Diana where St. Paul's cathedral now ftands, from the great number of ox-heads that were found there in digging up the church-yard in the reign of king Edward I., and were then looked upon as Gentile facrifices: and in this opinion he is followed by his learned editor, (Gibfon) by Mr. Sammes, Mr. Howel, and others. Dr. Woodward, particularly (in his Letter to Sir Chriftopher Wren, § 83.) acquaints us that he had in his collection tufks of boars, horns of oxen and of ftags, as alfo the reprefentation of deer, and even of Diana herfelf, upon the facrificing veffels, dug up near St. Paul's church; and likewife a fmall image of that goddefs, found at no great diftance. From ancient writers it appears, that not only ftags, but oxen, and alfo fwine, were facrificed to Diana. An ancient MS. in the Cotton library informs us, that in the time of Melitus, the firft bifhop of London, Ethelbert, king of Kent, built a church to the honour of St. Paul, on the fite where before ftood a temple of Diana: and there were alfo certain ceremonies performed at this church, on the day of St. Paul's converfion, by the multitude, which evidently alluded to the worfhip of Diana, and manors held by the fervice of offering a doe, or buck and doe, at the high altar of the church, on the above-mentioned day. A ceremony of this kind was continued till the days of queen Elizabeth. Jortin's Life of Erafmus, vol. ii.

DIANA, in *Zoology*. See SIMIA.

DIANA's *Peak Mountain*, in *Geography*, one of the higheft in the ifland of St. Helena, rifing 2692 feet above the level of the fea.

DIANA's *Tree*. See ARBOR.

DIANÆ *Fanum*, in *Ancient Geography*, a promontory of Afia Minor, in Bithynia, at the entrance of the Euxine fea, according to Ptolemy. Jupiter Urius had a temple on this promontory.—Alfo, a place of Italy, in Campania, 30 ftadia from Capua.—Alfo, a place of Greece, in Attica.

DIANDRIA, in *Botany*, (from δις, *double*, and ανηρ, *a man*,) the fecond clafs in the Linnæan artificial fyftem, containing plants with two ftamens only, in the fame flower with the piftil. It confifts of three orders, of which the firft, *Monogynia*, is by far the moft numerous. It feparates fuch of the natural order of labiate flowers as have only two ftamens, from their allies in the 14th clafs, *Didynamia*, whofe ftamens are four, two of them longer than the others; and this is one of the unavoidable defects of all artificial fyftems, nor has any fyftem hitherto contrived, however natural in its

its pretenfions, efcaped fimilar or more inconvenient anomalies in fome part or other. See DIDYNAMIA, and DIADELPHIA. S.

DIANE, in *Geography*, a lake of confiderable extent on the eaftern fide of the ifland of Corfica, which, through a narrow channel, difcharges itfelf into the Etrurian or Tufcan fea. It is famous for its excellent oyfters, which are taken with pikes in thofe places where the lake is only ten feet deep. The oyfters that are pierced through are pickled; the others are placed in refervoirs, and fold at Baftia, Leghorn, and the ifland of Elba.

DIANELLA, in *Botany*. See DRACÆNA.

DIANENSIS, in *Ancient Geography*, an epifcopal fee of Africa, in Numidia, fituated in the town of Diana, mentioned by Antonine.

DIANES, a people of Afia, in Galatia. Steph. Byz.

DIANENTERIUM, a maritime place, 100 ftadia from Conftance. According to Ortelius, it was a place in the ifland of Cyprus.

DIANIUM, DENIA, a town in Hifpania Interior, fituated on an eminence, fo that it could be obferved at a diftance by navigators. It was one of the three towns on that coaft, the foundation of which was afcribed to the Marfeillefe, who called it *Artemifium*, from the Greek name of Diana. On a promontory of the fame name it had a temple of Diana, which was much venerated.—Alfo, an ifland of the Mediterranean, in the vicinity of that of Corfica. It was alfo called *Artemifia*.—Alfo, a promontory of Spain, in the Mediterranean, oppofite to the ifles called *Pityufæ*.

DIANO, in *Geography*, a town of Naples, in the province of Principato Citra, 13 miles N.N.W. of Policaftro.—Alfo, a town of Genoa, about two miles from the fea, and three from Oneglia.

DIANTHERA, in *Botany*. See JUSTICIA.

DIANTHON, in *Pharmacy*, an aromatic powder, now difufed.

DIANTHUS, in *Botany*, (from Δὶς, διὸς, *Jove*, and ἄνθος, a *flower*, a name given by Linnæus to the Pink and Carnation genus, the *Tunica* and *Caryophyllus* of former authors, in allufion to the magnificence and fragrance of the flowers.) Linn. Gen. 225. Schreb. 303. Willd. Sp. Pl. v. 2. 671. Sm. Fl. Brit. 460. Juff. 302. Gærtn. t. 129. Clafs and order, *Decandria Digynia*. Nat. Ord. *Caryophylleæ*.

Gen. Ch. *Cal.* Perianth cylindrical, tubular, ftriated, permanent, divided into five teeth at the orifice, and furnifhed at the bafe with two pair of fcales, fometimes more, croffing each other, various in length and breadth. *Cor.* Petals five, regular and equal; claws the length of the calyx, narrow, tapering downwards, inferted into the receptacle; borders horizontally fpreading, wedge-fhaped, abrupt, crenate, often bearded or glandular at the bafe. *Stam.* Filaments 10, awl-fhaped, about the length of the calyx, but five of them commonly fhorter than the reft; in fome fpecies all united at their bafe; anthers oval-oblong, compreffed, incumbent. *Pift.* Germen oval, fuperior; ftyles two, awl-fhaped, ufually longer than the ftamens; ftigmas fimple, linear, acute, recurved, downy on the upper fide. *Peric.* Capfule cylindrical, covered with the calyx, of one cell, opening by four teeth. *Seeds* numerous, roundifh, compreffed, affixed to a fquare columella about half as long as the capfule. In fome fpecies the ftamens of one flower and the ftyles of another are occafionally diminutive and abortive.

Eff. Ch. Calyx cylindrical, of one leaf, with fcales at the bafe. Petals five, with long claws. Capfule fuperior, cylindrical, of one cell.

The fpecies are arranged in four fections, characterized as follows. 1. Flowers aggregate. 2. Fl. folitary, feveral on the fame ftem. 3. Stem fingle-flowered, herbaceous. 4. Stem fhrubby. The number of fpecies in Willdenow are 32; twelve new ones are defcribed by Dr. Smith in the Prodromus Floræ Græcæ Sibthorpianæ. An attempt was made by the fame writer in the fecond volume of the Tranfactions of the Linn. Soc. to define the fpecies better than they had previoufly been, and fome unknown to Linnæus are there for the firft time defcribed; but feveral ftill remain obfcure. The genus is chiefly European and African, though one or two fpecies are found in China and Japan.

In the firft fection, the moft remarkable are: D. *barbatus*. Sweet William. "Flowers aggregate, in feparate bundles. Scales of the calyx ovate-awl-fhaped, as long as the tube. Leaves lanceolate." Curt. Mag. t. 207. Ger. em. 598. Native of Germany and Carniola. A hardy perennial herbaceous plant, frequent in gardens, where it varies with different hues of purple, red and white. In a wild ftate it is faid to be red, either plain, or fpotted with white. The garden varieties thrive beft in a rather dry calcareous foil, but are apt to rot in moifture, or much manure. Hence they require to be renewed perpetually by feed. They can, however, be encreafed by cuttings, or, as the florifts term them, pipings. D. *carthufianorum*. "Flowers moftly aggregate. Scales of the calyx ovate, awned, fhorter than the tube. Leaves linear, with three ribs." Found on banks and about the borders of fields, in Germany, Switzerland, and Italy. The flowers are red, with hairy petals. It requires a dry chalky foil, or lime rubbifh, but can fcarcely be preferved long in a garden. D. *Armeria*. Deptford Pink. "Flowers aggregate, bundled. Scales of the calyx lanceolate, hairy, as long as the tube."—Engl. Bot. t. 317. Found in gravelly ground in England and other parts of Europe. The petals are fomewhat lanceolate, toothed, rofe-coloured, elegantly fpotted with white. *D. japonicus*. Thunb. Fl. Jap. t. 23. Has much of the habit of the Sweet William, but the leaves are broad and elliptical, the calyx-fcales fringed, and fhorter than the tube. This has never been introduced into our gardens, and is known only by Thunberg's figure, and the few dried fpecimens which he has diftributed amongft his friends. D. *prolifer*. Engl. Bot. t. 956. Found in gravelly foils in fome few parts of England, is eafily kept as a hardy annual in gardens, fowing itfelf fpontaneoufly. The rufhy ftalks are each crowned by a head of fmall pink flowers, enveloped with numerous large broad fcariofe fcales. Of this fpecies D. *diminutus* of Linnæus, referred by him to the next fection, is moft affuredly only a variety, whofe flowers are folitary from poverty of foil.

The fecond fection comprehends numerous elegant fpecies, efpecially D. *Caryophyllus*. Carnation. "Flowers folitary. Calyx-fcales fomewhat rhomboid, very fhort. Petals crenate, beardlefs." Engl. Bot. t. 214. Curt. Mag. t. 39. Of this fine and fragrant flower, the varieties of colour and luxuriance are innumerable. Florifts diftinguifh two principal fubdivifions, Carnations and Pinks. The latter are diftinguifhed by an eye-like fpot, and a more humble growth, and are moft affuredly a diftinct fpecies, though botanifts have not ventured to define it, fubject to almoft as many varieties as the Carnation. Mr. Hudfon told Dr. Smith that he intended this common or pheafant's-eye pink by his D *arenarius*, it being fometimes found, feemingly wild, on old buildings. Both kinds are propagated by feeds, layers, or cuttings. See below. D. *deltoides*. Maiden Pink. "Flowers folitary. Calyx-fcales ovato-lanceolate, acute, two or four. Leaves bluntifh, fomewhat downy. Petals crenate." Engl. Bot. t. 61. A native of graffy gravelly paftures and fields, eafily kept in a dry garden, where it forms perennial tufts. The flowers are red, with a dark circle or eye. D. *glaucus* of Linnæus

Linnæus is a variety with white flowers and a violet-coloured eye. They are inodorous. D. *chinensis*. China Pink. "Flowers solitary. Calyx-scales awl-shaped, spreading, leafy, as long as the tube. Petals crenate. Leaves lanceolate." Curt. Mag. t. 25. Native of China, where it is much cultivated, as well as in our gardens. It is annually raised from seed, and some varieties thence frequently occur. D. *superbus*. Superb Pink. "Flowers solitary, panicled. Calyx-scales very short, pointed. Petals in many capillary segments. Stem erect." Smith Spicil. t. 19. Native of Lapland, Denmark, Germany, France, and Switzerland. It requires chalk or lime rubbish to succeed in a garden, and seldom lives more than two or three years. It is renewed by seed. The flowers are elegantly feathered, and in an evening highly fragrant. D. *virgineus*. "Flowers solitary, few on each stem. Calyx-scales very short and obtuse, only two to each flower. Petals crenate." Jacq. Austr. App. t. 15. Linn. Sp. Pl. 590. (D. rupestris; Linn. Suppl. 240.) Found on lime-stone rocks in Austria, France, and Switzerland. Haller mistook this for D. *caryophyllus*, it being his *Tunica*, n. 896. The flowers are inodorous, and inconspicuous compared with most other species; leaves very slender.

Of the third section the chief are, D. *cæsius*. Chedder Pink. "Stems single-flowered. Calyx-scales roundish, short. Petals crenate, hairy. Leaves rough in the margin." Sm. Fl Brit. 463. Engl. Bot. t. 62. (D. virgineus β; Linn. Sp. Pl. 590.) Native of lime-stone rocks in England and Switzerland. It has hitherto been observed only on Chedder rocks, Somersetshire, and by Mr. Davall on Roche blânche near Orbe, Switzerland. The leaves are very glaucous. Flowers pale pink, very sweet-scented. Some garden pinks, recently introduced, seem to originate from this species. D. *alpinus*. Dwarf Alpine Pink. "Stems single-flowered. Petals crenate. Outermost calyx-scales leafy, longer than the tube." Jacq. Austr. t. 53. A beautiful native of the Alps of Austria, Stiria, Siberia, and Savoy, two or three inches high, with large red scentless flowers, sometimes more than one on each stem.

In the fourth section are, D. *arboreus*. "Stem woody. Flowers in bundles. Calyx-scales numerous, very obtuse and abrupt. Leaves linear, glaucous." Sm. in Prod. Fl. Græc. 289. Linn. Sp. Pl. 590. (Betonica coronaria arborea cretica; Bauh. Hist. v. 3. 328.) Native of Crete, on rocks near the shore, where the late Dr. Sibthorp gathered it. A splendid figure of this most magnificent species is destined for his *Flora Græca*, that of Bauhin being the only one at present extant. The stem forms a dense bush, two or three feet high. The leaves are thick, narrow, obtuse and glaucous. Flowers pale red, remarkable for the numerous imbricated scales of the calyx. It seems to have been formerly in the French gardens, but is now lost. D. *fruticosus*. "Stem woody. Flowers in bundles. Calyx-scales elliptical, pointed, numerous. Leaves obovate-lanceolate, obtuse." Sm. in Prod. Fl. Græc. 289. Linn. Sp. Pl. 591. (Caryophyllus græcus arboreus, leucoii folio peramaro; Tourn. Cor. 23. Voyage, v. 1. 70, with a figure.) Found on rocks in the island of Seriphos; also in Crete. It has the habit of the last, to which Dr. Smith, from the examination of old dried specimens only in Tournefort's herbarium, referred it as a variety; but the drawings and better specimens brought to England by Dr. Sibthorp shew it to be probably a distinct species. The leaves are broader, green, not glaucous, and the flowers of a much deeper and finer colour. The calyx-scales moreover are fewer and more pointed. D. *juniperinus*. "Stem shrubby. Leaves awl-shaped. Calyx-scales about four, obovate with a sharp point, spreading, half as long as the tube." Sm. Transf. of L. Soc. v. 2. 303. Native of Crete. A small but very pretty species, of which no certain figure exists, for as Prosper Alpinus describes his Caryophyllus sylvestris arboreus, t. 38, as two cubits high, that synonym must surely belong to D. *arboreus*, our present plant, though truly shrubby, appearing to be scarcely a foot high. The leaves are pungent; flowers the size of D. *deltoides*, apparently white. D. *contortus*. Georgian Pink. Stem shrubby. Leaves awl-shaped. Calyx-scales about six, elliptic-lanceolate, short. Petals twisted, deeply cut. (D. orientalis; Don. Caut. 101. Sims in Curt. Mag. t. 1069. Caryophyllus orientalis fruticosus, tenuissimo folio, flore laciniato; Tourn Cor. 23? Sims.) Dr. Sims informs us this species is found about Tiflis, in Russian Georgia, and that he received it from the garden of Mr. Loddiges at Hackney. It perhaps scarcely belongs to this section of the genus, for many in the second have the bases of their stems not less woody. The flowers are red, with a very long slender calyx, and are remarkable for their twisted petals. From this last striking peculiarity, we have given the above name, for we could not adopt one from the gardeners, which is equally applicable to twenty species besides, highly exceptionable in itself, and though tolerated in old established Linnæan species, never applied by classical writers to new ones, any more than names of countries in general.

Dianthus, in *Gardening*, comprehends plants of the herbaceous flowery ornamental kind, of which the species chiefly cultivated in the garden are: the sweet William, or bearded pink (D. *barbatus*); clove pink or clove gilliflower (D. *caryophyllus*); the common, or maiden pink (D. *deltoides*); the feathered pink (D. *plumarius*); the gray-leaved, or mountain pink (D. *cæsius*); the China pink (D. *chinensis*); and the superb pink (D. *superbus*.)

Of the first sort, the principal varieties are: the broad-leaved, or sweet Williams; the narrow-leaved, or sweet Johns, with single and double flowers in each. And the chief of the sub-varieties in the first, or broad-leaved kind, are, with broad leaves, and tall deep red flowers, with tall flesh-coloured flowers, with pure white flowers, with white dotted flowers, with striped leaves and red flowers, large double rose-coloured, with sweet scented flowers, large double with deep purple bursten flowers, and with double variegated flowers.

But in the second, or narrow-leaved variety, they are with narrow leaves and deep red flowers, with pale red flowers, with pale red and flesh-coloured flowers, with purplish white-eyed flowers, with snow white flowers, with white and flesh-coloured flowers, with white and purple flowers, with white spotted flowers, and with red flowers and white borders, or painted-lady sweet-Williams. And it is observed by Martyn, that the broad-leaved sort, with very double flowers of a deep purple, inclining to blue, bursting the calyx, is not so much esteemed; but that the double rose sweet-William, with flowers of a fine deep rose-colour, and smelling sweet, is much valued, as it does not burst. The mule, or Fairchild's sweet-William, which is one of the narrow-leaved double sorts, supposed to have been produced from seeds of a carnation impregnated by a sweet-William; the flowers are of a brighter red than in either of the former; their branches not quite so large, but the flowers have an agreeable smell. The narrow-leaved kind are in general the most productive of double flowers.

Of the second species, there are both single and double varieties, with reddish flowers, with variegated red and white flowers, with variegated red, white, and purple flowers, with variegated red, scarlet, purple, and white flowers, and with variegated red or purple above, and white underneath.

And the carnations are distinguished by modern florists, from

from the difference of variegation into four claffes: as flakes having two colours only, and their ftripes large, going quite through the leaves. Bizarres, with flowers ftriped or variegated with three or four different colours, in irregular fpots and ftripes. Piquettes, having a white-ground, fpotted or pounced with fcarlet, red, purple, or other colours. Painted ladies, with the petals of a red or purple colour on the upper fide, and entirely white underneath. And each of thefe claffes have numerous fub-varieties, efpecially the third, which was formerly in moft efteem with florifts; but of late years the flakes have been in greater requeft. It is ufelefs, however, to enumerate their fub-varieties, as they are not by any means permanent.

In the Univerfal Dictionary of Gardening, it is mentioned, that the properties of a good carnation are thus ftated by florifts: The ftem of the flower fhould be ftraight, ftrong, and able to fupport the weight of the flower without hanging down: the flower at leaft not lefs than from thirty to forty-five inches high: the petals well formed, long, broad, ftiff, and pretty eafy to expand; or, as the florifts term it, make free flowers, being neither too clofe, nor too thin; the middle of the flower not advanced too high above the other parts; the colours bright, and equally marked all over the flower: the flower very full of petals, fo as to render it, when blown, very thick in the middle, with the outfide perfectly round. And Martyn adds, "that the lower or outer circle of petals, commonly called the guard leaves, fhould be particularly fubftantial; fhould rife perpendicularly about half an inch above the calyx, and then turn off gracefully in a horizontal direction, fupporting the interior petals, which fhould decreafe gradually in fize as they approach the centre, and this fhould be well filled with them. All the petals fhould be regularly difpofed, and lie over each other in fuch a manner, as that their refpective and united beauties may meet the eye altogether; they fhould be nearly flat, or at moft have a fmall degree of inflection at the broad end; their edges perfectly entire, without notch, fringe, or indenture. The calyx fhould be at leaft an inch in length, fufficiently ftrong at top to keep the bafes of the petals in a clofe and circular body; the colours diftinct, and the ftripes regular, narrowing gradually to the claw of the petal, and there ending in a fine point. Almoft one-half of each petal fhould be of a clear white, free from fpots." Thefe properties are, however, chiefly expected in the fine potted varieties, which, on coming into blow, are ufually placed together upon a ftand or ftage confiderably raifed and covered, in order to produce the fulleft effect, and by protecting them to continue longer in beauty.

The double varieties, as being more large and beautiful in their colours, fhould be principally cultivated. Some of them, efpecially the burfters, are extremely large, as three or four inches in diameter over the crown, or top part.

However, whole blowers and burfters are common to moft of the varieties, efpecially the flakes and bizarres; the former are thofe in which the calyx or outer cup is long, and of equal growth, opening regularly each way only at top, to admit a free and equal expanfion of the petals all round: the flowers in thefe, though fomewhat fmaller, are more equally expanded, and require lefs trouble in the management of their bloom than in the burfters. The latter are thofe in which the cup is large, and, as it were, fwollen, being liable to burft on one fide, and permit the petal to break out and produce irregular flowers, if care be not taken to prevent it by tying, and opening the calyx a little on the oppofite fide. The whole blowers are on this account the more convenient for culture, where much time cannot be fpared in attending to the flowers, efpecially at the time of their blowing.

Of the third fpecies, there is a cultivated variety in gardens, with white flowers, with a beautiful purple ring, and leaves rather more glaucous than in the common fort.

Of the fixth fpecies Martyn obferves, the roots often laft two years in a dry foil; but they are generally raifed from feeds annually. In the nurfery grounds, it is generally known by the name of Indian pink. Dr. J. Edward Smith mentions having had a plant from Mr. Sikes's, which feemed to be a mule between this and the firft fpecies.

And there are varieties, with red flowers, with purple flowers, with white flowers, with variegated flowers, each fingle and double, and imperial large-flowered.

Of the feventh fpecies, the varieties principally cultivated in the garden are as below, and which flower in the following order: the damafk pink, which is the firft of the double forts in flower; it has but a fhort ftalk; the flower is not very large, nor fo double as in many others; the colour is of a pale purple, inclining to red. It is very fweet in its fmell. The white fhock, which is thus denominated from the whitenefs of its flowers, and the borders of the petals being much jagged and fringed: the flower-ftalks are eight or ten inches in height. Its fcent is not fo agreeable as in fome other forts. The pheafant's eye, of which there are different varieties, and frequently new ones introduced, fome of which have very large double flowers; thofe which burft their pods are the leaft efteemed. They have firm flower-ftems, eight or ten inches high: the flowers large, whitifh, or blufh-coloured, with dark purple fpots in the middle. That fort of pheafant's-eye, called bat's pink, often flowers again in autumn. The cob pink, the ftalks of which are much taller than in thofe of the former forts; twelve or fifteen inches high; the flowers very double, and of a bright red colour; it has the moft agreeable odour of all the forts; flowering from the latter end of May to the middle of July. The old-man's-head pink, and the painted lady, flower in July, at the fame time with the carnation, to which they are more nearly allied than to the pink. The firft, when in its proper colours, is purple, and white, ftriped, and fpotted; but it is frequently of one plain colour, as purple: it continues flowering till the froft in autumn puts a ftop to it; and the flower having an agreeable fcent, renders it valuable. The latter is chiefly admired for the livelinefs of its colour; as it is not fo fweet, or of fo long continuance as the other. The clove pink has a large deep red flower, affording a ftrong fcent of the clove. And it is fuppofed by Martyn, that it is probable, that the red pinks take their rife from the carnation, whilft the pheafant's-eye pinks derive their origin from the fourth fort. Some, however, give them all as variations of the third; which is not, he conceives, likely.

There are fingle and double flowers of each of thefe forts.

Method of Culture.—Though the culture in thefe flowering ornamental plants is effected without much difficulty, confiderable attention is neceffary in the management of fome of the forts, to have them flower in the utmoft perfection and beauty.

Mode of Culture in the Sweet-William kind.—The fingle forts of thefe plants are readily increafed by fowing feed which has been carefully collected in a bed of light earth, that has not been much enriched by manure, in the latter end of March, or beginning of the following month, either over the furface or in flight drills, covering it in well: when the plants have attained a proper growth, as about the latter end of June, they fhould be removed and fet out on other fmall beds, prepared for them, planting them out fix or eight inches diftant each way, watering them, and keeping them perfectly free from weeds, till the following autumn, or fpring, when they muft be taken up, with good balls of earth about their roots, and fet out where they are to flower. It is by this method that new varieties are produced. Although

though thefe plants are perennial, they fhould be raifed every year from feed, to have them blow ftrong, and in the utmoft perfection.

Thefe, and the double forts, may be continued by flips or layers. In the former mode the flips fhould be planted out either in the early autumn or fpring months, where they are to remain, giving them a little water at the time, when the weather is dry. When the flips are taken from the young plants, they fhould be made quite down to the roots, fo as to have fibres to them. In this way the plants are often good, and flower well. Cuttings, or pipings, managed in the fame way, alfo fucceed well in many cafes.

In the latter method, the more tender branches fhould be laid down in the fummer months, water being frequently given, when the weather is hot and dry. After they have taken root perfectly, they fhould be feparated or taken off, and be planted out where they are to remain, or in beds of light earth, to be afterwards removed, a little water being given at the time. A few of the beft fhould be potted in the beginning of autumn, in order to be more conveniently removed under fhelter during the feverity of winter.

In their general management, thefe plants fhould be kept neither too moift, nor too dry, as in both fituations they are liable to fuftain much injury by the canker.

The feed for the culture of thefe plants fhould be collected, when perfectly ripened, from the beft and moft perfect flowers, which have grown at a diftance from any bad or inferior plants, and be kept in a dry fituation, till it may be wanted for ufe.

Mode of Culture in the Gilliflower, or Carnation kind.— Thefe plants may be raifed with facility in the beds or borders of pleafure-grounds, or gardens, where the foil is moderately light and dry; but in order to have them in the greateft fuperiority and perfection, it is the practice of florifts to employ a compoft prepared by mixing the furface vegetable mould of old paftures with well rotted ftable-dung, from old hot-beds, or neat's dung in the fame ftate, and fea-fand, in the proportion of a third of the former, and a fourth of the latter. Thefe materials fhould be well blended, and lie for a confiderable length of time, being frequently turned, before they are made ufe of. This mould may be employed, both for filling the pots with, and for forming the beds; and in preparing it for thefe purpofes, it fhould not be fifted fine, but merely well broken down and reduced by the fpade.

Thefe flowers may be increafed, and new ones produced by feeds, which fhould be fown on beds formed of the above compoft, or on the common borders of light fine mould, from about the middle of March to the fame period in the following month, raking it in evenly, to the depth of a quarter of an inch, giving flight waterings when neceffary, to promote their vegetation. The fine forts are likewife often fown in pots or boxes, in order that they may be readily placed, fo as to have only the morning fun when the feafon is hot and dry.

After the plants are come up, they fhould be kept clear from weeds, and be watered occafionally, and about July, when the weather is moift, be taken up, and pricked out in nurfery-rows, on beds three feet in width, fetting them fix inches diftant, and watering them well at the time, and afterwards, till they have taken frefh root.

At the beginning of autumn, as about September, they will have attained a large growth, and require to be removed into other beds, or fituations for flowering, in which they fhould be fet out in rows eight or nine inches diftant each way. Some place them in the quincunx manner, as producing a better effect. In this fituation they fhould be protected in fevere weather during the winter, by the application of mats upon hoops placed over the beds. The culture they require in thefe beds is merely that of keeping them free from weeds, occafionally ftirring the earth between them by a hoe, and as their flower-ftalks advance giving them the fupport of handfome fticks. They fhould remain in thefe fituations till they flower, after which, the fingles fhould be taken out, and made ufe of as there may be occafion, in order to afford full room for the double forts, the fineft and moft perfect of which being made ftage or principal flowers, and the others fet out in the borders; the whole being increafed as there may be neceffity, by layering both the firft and fucceeding years.

The layer method is that which is principally employed in increafing and continuing particular varieties, as being the moft certain. For this purpofe, the radical leafy fhoots, proceeding from the crowns of the plants, when of fix or eight inches growth, are the moft proper. Thefe fhould be laid down into the earth, about the latter end of June, or beginning of the following month. The work is performed by ftripping off the leaves from the lower part of the fhoot, cutting off a little of the top, and then fixing upon a ftrong joint, about the middle, to flit it with a fharp knife, nearly half way through, in a flanting manner, fo as nearly to reach the joint above, forming a fort of tongue on the under fide of the fhoot, removing the bark from the enlarged part or joint, to promote the ftriking root. The mould about the root of the plant fhould then be ftirred, and frefh added, where it is wanting, forming a flight drill or opening for the branch to be gently laid down into, in a horizontal manner, with the cut part in the earth, the top being left out, and raifed a little, to keep the flit open, pegging the main part of the branch down, by fhort hooked fticks, drawing the earth over the cut part. When this method has been practifed on all the branches, a good watering fhould be given, to fettle the mould about them, and frequently repeated when the feafon is dry, in order that they may ftrike root more perfectly. When the layers thus formed have ftricken good roots, which is moftly the cafe in fix or eight weeks, they fhould be taken off with the root fibres as entire as poffible, and after having the fticky parts about the bottom and the top leaves trimmed off, be planted out either in pots or beds; in the latter method at fix or eight inches diftance, with a dibble, a good watering being immediately given, and repeated every two days for ten days or a fortnight, till the plants become well rooted. They fhould be removed from thefe beds, with balls of earth about their roots, in the beginning of the autumn, into fmall pots, to have fhelter during the winter, and in the early fpring be placed in large ones for flowering; but when there is room, it is a better practice to plant them at once in the pots, as frequent tranfplanting injures their growth. Some florifts, however, think it beneficial by checking their too vigorous growth.

The lefs fine forts may at the above feafon be planted out in the clumps, borders, or other parts, to be left in the beds for flowering.

And thefe flowers may likewife be increafed by cuttings, or pipings, in the manner directed in raifing pinks, as given below.

And in the winter management of the plants, the fine potted forts fhould about November be removed under the protection of a deep frame covered with glafs, and plunged clofely together in a flight bed of old tan, dry fand, or earth. In this fituation they fhould have a free admiffion of air, when the weather is mild, but be covered in froft, and care fhould be taken that there be no ftagnation of moifture, by the holes in the bottoms of the pots being obftructed,

as

as by that means they would be much injured, if not deſtroyed.

The flowers which are in the beds ſhould be covered by mats, or other contrivances, when the weather is ſevere at the ſame ſeaſon, care being taken to remove them when the weather is fine in the day time.

And in the ſpring ſeaſon their culture ſhould be continued, by removing thoſe fine varieties which were planted out in ſmall pots in the preceding autumn into large ones for flowering, and ſuch as have remained in the nurſery-beds into the borders or large pots, nine or ten inches over at top, to afford flowers, in each of which the buſineſs ſhould be done by preſerving balls of earth about their roots, about the begining of March, or the following month. The work is performed by cloſing the holes in the bottoms of the pots with pieces of oyſter ſhells or tiles, then filling them half way up with the earth prepared as above, placing the plants with their balls of earth in them, and filling up the vacancies on the ſides with more freſh mould, cloſing it well up about the bodies of the plants, ſo as they may ſtand nearly as high as the tops of the pots, giving a good watering at the time.

When the plants have been thus potted, they ſhould be placed in a ſheltered ſunny ſituation in the open air, being frequently refreſhed with water in hot dry weather.

It is the practice with ſome floriſts to plant two flowers in a large pot: but it is better, as well as more convenient for layering, only to have one; the plants flowering ſtronger, and making more free and finer ſhoots.

And in the ſummer treatment of the flowers, the care of frequent watering ſhould be continued when the weather is hot and droughty, and the ſurface mould be occaſionally ſtirred to promote the growth, and preſerve neatneſs; and when the flower-ſtalks are a little advanced, handſome painted ſticks ſhould be placed for their ſupport both in the pots, and other ſituations; to which they ſhould be neatly tied as they proceed in their growth. When they approach the period of flowering, thoſe which are curious ſhould be removed to a ſtage conſtructed for the purpoſe, and provided with an awning to protect them from being injured by the ſcorching heat of the ſun in the middle of the day, and the effects of too much wet, by which they are continued much longer in blow and beauty.

In regard to ſtages of this nature, they are formed in different methods, according to the fancy of the perſons who make uſe of them. That deſcribed below is a neat mode of conſtructing ſuch apparatus: a platform is erected at the height of eighteen inches or two feet from the ground, conſtituted of two ranges of planks, in order to contain two rows of pots, ſuſtained by poſts in one or two rows underneath, with an open-work roof five or ſix feet in height, covered by means of painted canvas, or ſome other ſuitable material; the whole being ſupported by upright poſts, according to the taſte of the proprietor or perſon who has the management of it.

And the body of the ſtage ſhould be neatly painted for the purpoſe of effect, as well as the preſervation of the wood of which it is conſtructed.

Inſtead of theſe kinds of ſtages, ſome make uſe of a ſort of caps or umbrellas formed of tin, or other ſimilar materials, ſupported on ſtems or ſticks, one for each plant; but theſe are neither ſo convenient, nor afford ſo good an effect as the former, in diſplaying the beauties of the flowers, while in blow.

But whatever may be the nature of the contrivances which are made uſe of for the protection and diſplay of theſe curious flowers, the tying of the plants to the ſupport-ſticks ſhould be continued as the ſtems advance; and ſome curious floriſts contrive to keep them erect at the tops by the uſe of fine wire or other ſimilar means. And in order to procure the flowers as large and fine as poſſible, they trim off all the ſide-ſhoots from the ſtems, leaving only one or two of the top flower buds to expand. When the flowers begin to open, care ſhould be taken to prevent their burſting and expanding in an irregular manner, eſpecially in the burſters, by making a little opening or two in the indentings at the top, and at equal diſtances in other places, by means of fine ſmall pointed ſciſſars. The regular expanſion of the flowers may likewiſe be much aſſiſted, eſpecially where one ſide is more expanded than the other, and they are in pots, by turning the pots, that the contrary ſides may have the full influence of the ſun and light.

And ſome floriſts likewiſe, to blow the curious ſorts as broad and fine as poſſible, make uſe of a kind of ſpreading ſtiff white paper collar, cut open on one ſide, and placed round the bottoms of the flowers to expand the petals upon to the utmoſt extent; but the practice is not in general adviſable, or much had recourſe to at preſent by thoſe who are curious in flowers.

As theſe ſorts of plants flower leſs perfectly as they increaſe in age, it is proper to provide freſh ſupplies of new varieties of them annually by ſowing ſeed obtained from the beſt ſorts in the ſpring ſeaſon, as directed above, and likewiſe to continue the moſt valuable double varieties by means of layering in the ſummer months every year, or the planting of cuttings or pipings, but the firſt is by much the beſt mode of accompliſhing the buſineſs.

And in order to have good ſeed, ſome plants of the beſt and moſt curious ſorts ſhould be preſerved diſtinct, and ſuffered to flower and ripen their ſeed in a perfect manner, which ſhould then be taken off in the pods when the weather is dry, and, after being hardened a little, rubbed out and put up in a bag to be placed in a dry ſituation till wanted for ſowing.

Mode of Culture in the Pink kind.—All the ſpecies and varieties of theſe plants may be increaſed from ſeeds, and the perennial ſorts likewiſe by layers, ſlips, cuttings, and pipings, being managed as directed below.

Where the beſt ſorts only are grown, great care ſhould be taken in providing the ſeed, that it be always had from the beſt and moſt perfect kinds in a full ſtate of maturity.

It ſhould be ſown in the manner directed for carnations, in the beginning of March or the following month, and the plants be managed in a ſimilar manner, only, as being more hardy in their nature, with leſs tenderneſs, and care.

But the ſixth ſpecies is beſt increaſed by ſowing the ſeed on a very gentle hot-bed the beginning of April, as the vegetation is thereby much forwarded. When the plants appear air ſhould be admitted freely, to prevent their drawing up weak; and when of a little growth they may be pricked out with good roots, if the weather be ſuitable, on a bed of light earth, at about three inches diſtance, proper ſhade and water being given. When they are of conſiderable growth, as about the latter end of May, they ſhould be removed with good balls of earth about their roots, and planted where they are to remain for flowering.

The layers ſhould be laid down in the latter end of July or beginning of the following month, in exactly the ſame manner as has been directed for carnations, giving them the ſame culture in every reſpect, till they flower.

In caſes where there are large plants that ſpread conſiderably in a lateral manner, their ſhoots may be covered in the ſpring to the depth of an inch or two; they will thus often take root, form good plants, and be in a ſtate to be planted out in the beginning of the autumn following.

 And

And the ſlips of the young ſhoots, either made from the ſides of the principal ones, or from the roots, ſo as to have fibres to them, and planted out in February, or the two following months, in beds of good mould to a good depth, readily take root, and become good plants before the end of the ſummer, at which time, or in the following ſpring, they may be removed with good balls of earth about their roots, to the places where they are to flower and grow.

Likewiſe cuttings made from the firm ſhoots of the ſame year at the joints, to the length of three or four inches, when planted pretty deeply in a bed of very fine mould, or in large pots at the diſtance of an inch or two, and well watered at the time, readily grow and become plants after being tranſplanted into ſeparate pots, or the borders where they are to flower.

Alſo pipings made by drawing out or breaking off the top parts of the young ſhoots at the joints and trimming them, by which a ſort of pipe is formed, on being planted and managed in the ſame manner, take root and afford good plants.

And in both theſe laſt methods the rooting of the ſhoots is generally promoted by their being cloſely covered by bell, hand, or other ſorts of glaſſes, and having frequent ſlight waterings given round the ſides of them.

In reſpect to the ſeed of the different beſt ſorts, it ſhould be collected in the pods in Auguſt or the following month, when perfectly ripened, chooſing a dry ſeaſon for the purpoſe, ſpreading them out to harden and become dry on paper, or in ſome other manner, after which it ſhould be rubbed out and kept in ſome dry ſituation till it is wanted.

All the different ſpecies and varieties of theſe plants are highly ornamental, and many of them curious, affording an extremely fragrant ſmell during the ſummer months.

The firſt ſort in all the varieties may be made uſe of in the borders, clumps, and other places, where they produce a fine effect by the variety of their flowers in aſſemblage with others of ſimilar growth and ſize.

A few of the double more curious kinds may alſo be cultivated in pots for adorning the more conſpicuous places about the houſe and walk contiguous to it.

The ſecond ſpecies, and all the different varieties of the carnation kind, are proper ornamental plants for the fronts of clumps, borders, and other principal parts of gardens or ornamented grounds, where they have a very agreeable effect from the beauty and elegance of their flowers, as well as the fragrance which they afford during the ſummer ſeaſon.

But the curious double ſorts are moſtly cultivated in pots for the convenience of protection, and being exhibited on ſtages, or in particular ſituations during the time of their blowing, as well as for the eaſe and facility of removal, when neceſſary, to different ſituations.

Likewiſe the third ſort, and the different varieties of the common pink, are all well adapted for producing ornament in the fore parts of beds, borders, and other compartments of pleaſure grounds and gardens, both from the multiplicity of their flowers and their beauty, as well as fragrant ſmell. Theſe are ſometimes uſed for edgings, but from their ſpreading growth they require frequent cutting, when thus employed.

The fourth and fifth ſorts may likewiſe be employed for the purpoſe of affording a greater variety in theſe different ſituations.

The fixth ſpecies is extremely ornamental from the fineneſs of the colour of the flowers, and the great length of time during which they continue in bloom.

It is obſerved by Martyn, that the ſeventh ſpecies, from the elegance and delicious fragrance of its flowers, is deſerving of being employed in all curious gardens.

In the buſineſs of planting out the various ſorts, the annual kinds are moſtly diſpoſed in patches of three or four plants in each; but the perennial kinds ſingly, as being more buſhy and ſpreading in their habit of growth.

All the different ſpecies and varieties of theſe flowery plants may be brought to blow much more early by being cultivated in frames or the hot-houſe, where there is convenience for it.

DIANUCON, in *Pharmacy*, a kind of rob made with the juice of green walnuts and ſugar: it is now diſuſed.

DIAPALMA, a plaſter much reſembling the diachylon. See Emplastrum.

DIAPASMA, a common name for all powders ſprinkled on the body, whether as perfumes or otherwiſe.

The word comes from the Greek διαπασσειν, *inſpergere, to ſprinkle.*

DIAPASON, in the *Ancient Muſic*, implied the interval or concord of an octave, ſo called, becauſe it contains all the diverſities of ſound. It is $\frac{1}{2} = 612\ \Sigma + 12\,f + 53\,m$. Inſtrument-makers, by diapaſon, underſtand the ſtate of the meaſures, and the proportions of the ſeveral parts of their inſtruments. See Organ.

Guido, in his Chap. de Diapaſon & Tinctor; in his Diffinitorium, or Primitive Muſical Dictionary, gives ſeven definitions of the term *diapaſon.*

1. Diapaſon has three diſtinct ſignifications: as a concord, an interval, and a proportion.

2. Diapaſon ariſes from the mixture of two perfect concords, a 4th and a 5th, or from two diſcords, a falſe 5th and a tritonus.

3. Diapaſon is the conjunction and interval of a perfect 4th and 5th.

4. Diapaſon is expreſſed in numbers by $\frac{1}{2}$ or $\frac{2}{4}$. It has, like other intervals, three qualities: it is perfect, imperfect, and ſuperfluous.

5. Diapaſon perfect, conſiſts of five tones and two ſemi-tones, of which five are concords, and two diſcords.

6. Diapaſon imperfect, is that which conſiſts of four tones, and three ſemi-tones.

7. Is only a diapaſon in appearance: as from ♭ *mi*, to the ♭ *fa* above. Theſe are what we now term falſe octaves, and the moſt offenſive of all diſcords.

Diapason *Stop* in an organ, is the foundation upon which the chorus, or full organ is conſtructed; and by the length of the longeſt pipe in that ſtop, the magnitude of the whole inſtrument is known: as an 8 feet, a 16 feet, a 32 feet, or a 64 feet organ, to which ſeveral organs in Holland and Germany amount. The proper compaſs of a voice, or inſtrument, is called its diapaſon. The word is derived from δια, *through*, and πασων, *the whole;* becauſe the octave includes the whole compaſs of the whole ſyſtem.

Diapason *diateſſaron.* The Pythagoreans did not admit this interval as a conſonance or concord; for this reaſon, that its ratio 8 : 3 was neither multiple nor ſuper-particular. But Ptolemy contends for its being a good concord, for this reaſon, that the diapaſon added to any concord produces a concord. Ariſtoxenus herein agrees with him. Vide Wallis's Append. ad Ptolem. Harm. p. 155.

Diapason, among *Muſical Inſtrument-Makers*, is a kind of rule, or ſcale, whereby they adjuſt the pipes of their organs, and cut the holes of their flutes, hautboys, &c. in due proportion, for performing the tones, ſemi-tones, and concords, juſtly.

A ſquare being divided into eight equal parallelograms; the points wherein a diagonal interſects all theſe parallelograms,

grams, expreſs all the uſual intervals in muſic; and on this principle it is that the diapaſon is founded.

There is a particular kind of diapaſon for trumpets, ſerving as a ſtandard, or meaſure, for the different magnitudes they muſt have to perform the four parts of muſic. There is another for ſackbuts, and ſerpents, ſhewing how far they are to be lengthened, or ſhortened, to riſe or fall from one tone or interval to another.

The bell-founders have likewiſe a diapaſon, or ſcale, ſerving to regulate the ſize, thickneſs, weight, &c. of their bells.

Diapason-*diaex*, a kind of compound concord; whereof there are two ſorts: the *greater*, or the interval of a major thirteenth, whoſe ratio is $\frac{3}{10}$ths, or VIII + VI = 1063 Σ + 21 *f* + 92 *m*; and the *leſs*, or the interval of a minor thirteenth, whoſe ratio is $\frac{5}{16}$ths, or VIII + 6th = 1027 Σ + 20 *f* + 89 *m*. See Concord.

Diapason-*diapente*, a compound conſonance, in a triple ratio of 9 to 3.

The diapaſon-diapente is a ſymphony made when the voice proceeds from the firſt to the twelfth tone. The word is properly a term in the Greek muſic: we ſhould now call it a twelfth. It is the interval of a major twelfth, $\frac{1}{3}$, or VIII + V = 970 Σ + 19 *f* + 84 *m*. (See Concord.) Martianus Capella thought this interval to be equal to 9 major tones and a minor ſemi-tone, but which exceed it by 2 ſchiſmas (2 Σ).

Diapason-*diateſſaron*, a compound concord.

The diapaſon-diateſſaron is a ſymphony wherein the voice proceeds from the firſt tone to the eleventh. This the moderns would rather call an eleventh. It is the interval of a minor eleventh, $\frac{3}{8}$ths, or VIII + 4th = 866 Σ + 17 *f* + 75 *m*. (See Concord.) M. Capella ſtates this interval to be equal to 8 major tones and a minor ſemi-tone, but which exceeds it by 2 Σ.

Diapason-*ditone*, expreſſes the interval of a major tenth, $\frac{2}{5}$ths, or VIII + III = 809 Σ + 16 *f* + 70 *m*. See Concord.

Diapason-*ſemi-ditone*, is the interval of a minor tenth, $\frac{5}{12}$ths, or VIII + 3d = 773 Σ + 15 *f* + 67 *m*. See Concord.

DIAPEDESIS, διαπήδησις, in *Medicine*, a term employed by Galen and his followers, to denote a fourth mode, by which hæmoptyſis may be produced, (in addition to thoſe mentioned under the term Diabrosis,) namely, when the contained fluids tranſude, as it were, through the unbroken membranes of the veſſels: and, he ſays, that this may happen when the coats of the veſſels become thinner, and the blood is more diſſolved, ſo as to paſs through the pores of the veſſels, as through a ſieve. Quickſilver, ſays Van Swieten, gives no unapt inſtance of this diapedeſis, when it is ſqueezed through leather to purify it; for it tranſudes in minute drops, the leather remaining entire. But, he juſtly adds, although this may ſeem not altogether impoſſible, yet it is hard to conceive that the red blood, which is the moſt denſe of the human fluids, ſhould ſooner force its way through the pores of the membranes of the veſſels, than paſs from the arteries into the veins. See Galen Meth. Med. lib. v. cap. 2. Van Swieten Comment. § 1199.

DIAPENSIA, in *Botany*, (according to profeſſor Martyn, from διαπενθεω, *to mourn*, or *grieve deeply*, probably from its dreary place of growth. But Ambroſinus derives it from δια and πεντε, as if compoſed of five, and in this ſenſe it certainly was applied by the botaniſts of his time to the *Sanicula*, whoſe leaves are compoſed of five lobes. Linnæus, finding the name, as he tells us, in the Flora Lapponica, unoccupied, adopted it for his new Lapland genus, in alluſion, as it ſhould ſeem, to its five-cleft flower and five ſtamens.) Linn. Gen. 79. Schreb. 104. Willd. Sp. Pl. v. 1. 795. Juſſ. 135. Claſs and order, *Pentandria Monogynia.* Nat. Ord. *Preciæ*, Linn. *Convolvulis affine*, Juſſ. *Ericæ*, Saliſb.

Gen. Ch. *Cal.* Perianth of eight leaves; the five innermoſt ranged in a circle; the reſt imbricated upon them; all equal, ovate, obtuſe, erect, permanent. *Cor.* of one petal, ſalver-ſhaped; tube cylindrical, pervious, the length of the calyx; limb in five obtuſe horizontal ſegments. *Stam.* Filaments five, linear, flattened, erect, ſhort, inſerted into the top of the tube, between the ſegments of the limb; anthers ſimple, according to Linnæus, but more juſtly repreſented in the *Paradiſus Londinenſis*, as of two diſtinct, ſeſſile, elliptic lobes. *Piſt.* Germen ſuperior, roundiſh; ſtyle cylindrical, erect, its top on a level with the anthers; ſtigma blunt, with three ſlight notches. *Peric.* Capſule ovate, with three cells and three valves, the partitions contrary to the valves. *Seeds* numerous, roundiſh.

Eſſ. Ch. Corolla ſalver-ſhaped, five-cleft. Calyx of five leaves, encompaſſed by three others. Stamens crowning the tube of the corolla. Capſule of three cells. 1. D. *lapponica*. Leaves tongue-ſhaped, recurved, ſmooth. Anthers without ſpurs. Linn. Fl. Lapp. ed. 2. 57. t. 1. f. 1. Sp. Pl. 202. Oed. Fl. Dan. t. 47. Saliſb. Parad. t. 104. Sims in Curt. Mag. t. 1108. Found by Linnæus very abundantly on the Alps of Lapland. We have it alſo from the coaſt of Labradore. Oeder had it from Norway. It bloſſomed in the garden of the right honourable C. Greville, at Paddington, in February, 1808, for the firſt time we believe in England. The branching ſtems form little denſe tufts, clothed with crowded leaves, which ſpread in every direction, and are tongue-ſhaped, recurved, entire, ſmooth, keeled beneath, channelled above; the lower ones permanent, though faded and almoſt black. Flowers ſolitary, on ſimple terminal ſtalks. Corolla of a brilliant white, with yellow anthers. 2. D. *barbulata*. "Leaves ſomewhat wedge-ſhaped, downy beneath. Anthers ſpurred at the baſe." Saliſb. Parad. (Pyxidanthera barbulata; Michaux Fl. Boreal. Amer. v. 1. 152. t. 17.) A native of the mountains of North Carolina. Dr. Sims and Mr. Saliſbury have both indicated the generic affinity of this plant to the former. We have ſeen no ſpecimens of it. S.

DIAPENTE, in *Muſic*, the name given by the Greeks to the interval which we call the 5th, or 2d concord, in point of perfection. (See Fifth.) The word is formed of δια, *through*, and πεντε, *five*, as, in forming this interval diatonically, it conſiſts of five degrees.

Diapente is alſo uſed, in *Pharmacy*, for a compound of five ſeveral drugs, or ingredients.

Diapente, among *Farriers*, a drink made for horſes of gentian, round birthworth, barberries, myrrh, and ivory-ſhavings, of each a like quantity, which are to be pounded ſeparately, and finally ſearced: this powder, to the quantity of two or three ſpoonfuls, is mixed with a pint and a half of muſcadine, or ſack, or, for want of either, with ſtrong ale or beer, and given in fevers, the cough, glanders, ſurfeits, inflammations, yellows, &c. It is ſaid to purify the blood from all foulneſſes, as well as to reſtrain the overflowing of the gall, working of the ſpleen, &c.

DIAPER is a name given to a particular ſpecies of cloth, uſed chiefly for table linen. It is known by the French by the name of *toile fourré*, and is ornamented with the moſt extenſive figures of any kind of tweeled cloth, excepting damaſk. The mounting of a loom for working diaper is, in principle, much the ſame as a draw-loom, but the figures being leſs extenſive, the mounting is more ſimple,

and is wrought entirely by the weaver, without the aid of any other perfon. As tweeled cloths, of any number of leaves, are only intervowen at thofe intervals when one of the leaves is raifed, the woof above, and the warp below, is kept floating, or flufhed, until the interfection takes place. Of confequence, the floating yarn above appears acrofs the fabric, and that below longitudinally. This property of tweeled cloths is applied to form the ornamental figures of all kinds of tweeled goods, merely by reverfing the floating yarn when neceffary. In the fimpler patterns, this is effected by a few additional leaves of treddles; but when the range of pattern becomes too great to render this convenient, an apparatus, called a *back harnefs*, is employed, and the cloth woven with this mounting is called diaper. Diapers are generally five-leaf tweels, that is to fay, every thread of warp floats under four threads of woof, and is raifed, and, of courfe, interwoven with the fifth. This is done either fucceffively, forming diagonals at 45° upon the cloth, or by intervals of two threads, which is called the broken tweel. The latter is generally, if not univerfally, adopted in the manufacture of diaper. The reafon of preferring the broken to the regular tweel, where ornaments are to be formed, is very obvious. The whole depending upon reverfed flufhing to give the appearance of the figures, and the regular flufhing that of the ground, the appearance of oblique or diagonal lines through either would deftroy much of the effect, and materially injure the beauty of the fabric. The broken tweel, on the contrary, reftores to the tweeled cloth a great fimilarity of appearance to plain or alternately interwoven fabrics, and, at the fame time, preferves the facility of producing ornaments by reverfing the flufhing. The fimpleft kinds of reverfed tweels will be found in the articles DIMITY and DORNOCK. The diaper mounting is reprefented by *Figs.* 1 and 2, *Plate* VIII. *Mifcellany*.

Fig. 1, is the profile fection of the mounting of a loom for diaper, viewed from the right fide. A is the breaft beam before which the weaver fits when weaving. After paffing over this beam, the cloth is wound upon the cloth beam below, and kept faft by the ratchet-wheel K. which is fecured by a catch, fixed to one of the fide rails, or knees of the loom, as in plain weaving. The frame-work is not reprefented in the figure, becaufe it would prevent the view of thofe parts of the mounting which are peculiar to diaper, and differs in nothing from that of a loom for plain cloth of equal breadth and ftrength of fabric. B is the yarn beam, and I the rods between which the threads of warp pafs. At L is reprefented the point where the warp is intervoven with the woof to form the cloth. The lay and fhuttle are not reprefented for the reafon already given. The parts, in which the diaper mounting differs from that of moft other looms, are at D and C. The former of thefe reprefents the treddles, in number five, worked by five treddles below at E, the front leaf being raifed, the back leaf funk, and the three intermediate leaves ftationary. At C is the back harnefs moved, when neceffary, by the weaver's hand, by pulling one of the cords above through the board M, perforated with holes, in each of which is a notch, to fecure a knot upon the cord, when pulled down to raife the leaf.

In the figure the back leaf is raifed, and all the others ftationary. The motion is communicated by means of the cords attached to the leaves of the harnefs, which paffing over the pullies in the box or cafe H, are made faft to a piece of wood G, fixed to one fide of the loom, or to the wall of the fhop, as moft convenient. The front treddles at D are connected by cords above to the top levers N, and the motion continued to the treddles by long and fhort marches, as in other looms mounted for ornamental weaving. As diaper fabrics are always of ftrong coarfe yarn, the eyes of the harnefs leaves are made of iron or copper, and are called nails; one of thefe is reprefented by *fig.* 2. The eyes of the front leaves are made of a length rather more than the whole depth of the fhed to be formed. When a diaper loom is mounted, the effect of the harnefs is as follows: Let the tweel, which by reverfing forms the figure, be one of five leaves. In this cafe five threads of warp are drawn through every mail of the harnefs, and one of thefe threads through every leaf of the front-mounting. According to each change of pattern, the number of back harnefs leaves is to be arranged. All thofe which are raifed will then form the figure, and thofe which remain ftationary, the ground. This is effected by the weaver pulling the cords which pafs through the board G, until the number of leaves required be raifed. He then preffes down his treddles in fucceffion, until a change is required. As the eyes in front are as long as the depth of the fhed, thofe threads which pafs through the mails which are raifed will be funk by the top of the eye, and the threads which are funk by the harnefs, will be raifed by the treddles. But as only one leaf of treddles is raifed, one funk, and three ftationary, only one thread in every five will be affected by the front mounting, for the long eye of the treddle which rifes will have no effect upon that part of the warp which has been already raifed by the harnefs, and the leaf which finks will have as little upon thofe which are already down. In the raifed mails forming the pattern, therefore, four threads will always be above the woof, and one below; in the funk mails for the ground, the exact converfe takes place. The two croffed lines between the harnefs and front treddles will fhew the effect produced. The pattern is thus produced entirely by the harnefs, and the remaining part of the operation is exactly the fame as common tweeling.

In mounting diaper looms, the mails of the harnefs muft be tied fo low as to allow the warp to touch the race upon which the fhuttle runs, that its motion may not be interrupted. When the webs are broad, it is alfo found convenient to ufe two fets of top levers, one fet being at each fide of the loom, in order to keep the leaves of treddles level, and to facilitate the weaver's power of treading, which in that, as in all heavy work, requires to be firmly done. The horizontal plan of the diaper mounting will be found in *fig.* 8; and the explanation of that figure in the article DRAUGHT and *Cording*.

DIAPERED, in *Heraldry*. See DIAPRÉ.

DIAPHANOUS, in *Philofophy*, a thing tranfparent, or that gives paffage to the rays of light; as water, air, glafs, talc, fine porcelain, &c. See TRANSPARENCY.

The word is formed of διά, *through*, and φαίνω, *I fhew*.

DIAPHANEITY, in the fchools, the quality of a tranfparent body; or that which denominates it fuch. See TRANSPARENCY.

DIAPHANES, in *Ancient Geography*, a river of Afia, in Cilicia, placed by Pliny on the frontiers of Syria.

DIAPHŒNIX, in *Pharmacy*, an ancient electuary, now obfolete, of which dates were a principal ingredient.

DIAPHONIA, in *Ancient Mufic*, a name given by the ancient Greeks to difcord, as founding twice, and by Guido to difcant, finging in two parts.

In the mufic of the middle ages, during the firft rude attempts at counter-point, diaphonia was fynonymous with organum, and implied a part fuper-added to the canto fermo of the church.

DIAPHONICS, from διά, *through*, and φωνή, *found*, is fometimes ufed for the fcience of refracted found, as it paffes through different mediums.

DIAPHORESIS, in *Medicine*, fynonymous with perfpiration. By fome it has been confined to the infenfible perfpiration, or halitus, from the fkin; but this diftinction is not generally adopted. See DIAPHORETIC.

DIAPHORETIC MEDICINES, are thofe which promote a difcharge by the fkin, whether it be by infenfible perfpiration, or by fweat.

In the common language of writers, the term diaphoretic is applied to thofe medicines only which promote the infenfible perfpiration, or the flighteft degrees of fenfible moifture on the fkin; and thofe which occafion fweating, they diftinguifh by the term of fudorific, or fudoriferous; but as, in the medicines ranged by authors under thefe titles, we can find no difference, but in the degree of force, or what arifes from the manner of adminiftration, we may comprehend the whole under the title of diaphoretics.

All the diaphoretic medicines operate either by exciting the force of the circulation, or by exciting the extreme veffels on the furface of the body only; and thefe two operations take place fometimes feparately, and fometimes together. As the aqueous part of the blood paffes off by the urine or perfpiration, the quantity of thefe excretions muft neceffarily be in proportion to the quantity of water, for the time prefent, in the mafs of blood; and the paffing of it by the one excretion or the other, will be determined by certain circumftances of the economy, which we fhall briefly confider.

The difpofition to perfpiration, both in health and in difeafe, depends much upon the condition of the fkin itfelf, although the activity of the general circulation, as we fee from the effects of exercife, as well as of fome ftates of fever, may be confidered as the prime mover of this excretion. Thus a coarfe and dark fkin, characteriftic of the melancholic temperament, is lefs difpofed to admit of perfpiration, than the foft fkin of the fanguine temperament; and a ftate of moderate health of the conftitution at large is lefs prone to increafe the action of the exhalant veffels, than a ftate of great fullnefs on the one hand, or of languor and relaxation on the other. As the urine and perfpiration are, as it were, counterbalances to each other, whatever increafes the difpofition to the one diminifhes that of the other. The ftate of the fkin is much connected with that of the ftomach; fo that thirft may be relieved by moiftening the fkin, and the fkin is often fpeedily relaxed by certain fubftances, as warm liquors taken into the ftomach.

There are two means, therefore, by which perfpiration may be induced, and the action of fudorific medicines promoted, namely, by application to the fkin, and ingefta.

When the fkin is not in a ftate unfavourable to perfpiration, the application of heat to the furface of the body, without any affiftance from powers internally applied, is fufficient to produce fweating; and the application of cold, *i. e.* the abftraction of the heat, can almoft certainly prevent the fame, though confiderable powers are employed within. Thus fweating may be obtained by the heat of the air, applied as in what is called the dry bagnio, or by increafing the heat of the furface by previous warm bathing, or by accumulating the warm effluvia of the body itfelf upon its furface. This laft may be done by covering up the body very clofely with fuch coverings as may both prevent the efcape of the warm effluvia arifing from them, and at the fame time prevent the accefs of external cold.

But, farther, to favour the diaphoretic action, a quantity of warm liquid may be taken into the ftomach, which not only excites the general circulation, but particularly, by confent of the veffels on the furface of the body with the ftomach, excites the action of thofe veffels which pour out fweat. The ufe of warm liquids alone, efpecially in the morning, while in bed, where there is a general difpofition to perfpiration, is in flight febrile cafes, an ample fudorific.

Thefe two means of covering up the body clofely, and taking warm liquids into the ftomach, are what we call the fudorific regimen; which will often anfwer alone the purpofe of exciting diaphorefis; is often neceffary to the operation of fudorific medicines; and will always render their operation more complete and permanent. Cullen Mat. Medica, vol. ii.

But although the application of heat to the furface of the fkin will in general excite perfpiration, it will not, as has lately been afcertained, invariably produce that effect; but, on the contrary, it will, under a certain condition of the fkin, rather impede than promote the fudorific procefs. The omiffion of this obfervation, added to the falfe opinions refpecting the importance of forcing perfpiration, has led to much mifchievous practice in febrile difeafes. It is now well underftood, though not fatisfactorily accounted for, that in the hot ftage of continued fevers, as in typhus, fcarlatina, &c. there is a peculiar conftriction of the veffels of the fkin, marked by extreme drynefs of its furface, and accompanied by great heat, which is increafed by increafing that heat, by means of external covering, and the exclufion of cool air. In this condition of the body, *cold* affords the only ready means of removing the febrile conftriction of the cutaneous veffels, and cold is, in fact, the only fudorific under fuch circumftances. This principle has been fully proved by Dr. Currie, (fee his Reports on Cold Water, &c.) and has been obferved by all who have adopted his practice of cold affufion, or fponging, in fevers. The writer of this article has frequently employed the fhower-bath, and the cold wafhing of the fkin, in the hot ftate of typhus, and a free perfpiration was its almoft invariable confequence. See COLD.

But although the external application of cold water was not often employed in fevers till within the laft thirty years, yet the internal ufe of cold water, for the purpofe of exciting perfpiration, appears to have been among the expedients of the ancients in the cure of fevers. Celfus mentions the practice of giving copious draughts of cold water in ardent fevers, and defcribes the confequences to be precifely fuch as are produced by the cold affufion externally, as we have frequently witneffed: the patient, he fays, falls into a found fleep, the heat remits, and a free perfpiration breaks out, although he had previoufly fuffered much from thirft, heat, and reftleffnefs. "Fereque poft longam fitim et vigiliam, poft multam fatietatem, poft infractum calorem, plenus fomnus venit, per quem *ingens fudor effunditur*, idque præfentiffimum auxilium eft." De Medicina, lib. iii. cap. 7. He mentions the fame practice again in the ninth chapter of the fame book. Galen and his immediate followers, as well as the phyficians of the fixteenth century, feem alfo to have made much ufe of cold water, and frequently for the purpofe of exciting fweat. See Lommius de Febribus.

A curious controverfy took place in this country early in the laft century, in confequence of the publication of a book, entitled, "Febrifugum Magnum, or common Water the beft Cure for Fevers," by Mr. Hancocke, not a member of the medical profeffion. He afferts, that a pint or a quart of cold water, fwallowed before going to bed, on the firft or fecond day of fever, generally produces a copious fweat, and cuts the fever fhort; and he has related feveral cafes in which thefe effects took place.

There can be little doubt that cold water, received into the ftomach in the hot ftage of fevers, produces its diaphoretic effects in confequence of the fympathy which exifts between that organ and the fkin: and in the fame way, moft probably, the vegetable acids and the neutral falts operate on the cutaneous veffels, as is maintained by Dr. Cullen (Ma-

teria Medica, vol. ii. p. 582.) and all the other fpecies of diaphoretics, which do not excite fweating by their ftimulant power upon the heart and arterial fyftem; fuch as ipecacuanha, antimony, &c. Thefe are the only fort of diaphoretics that can be employed with advantage or fafety in fevers, where the primary object is to procure a free difcharge by the fkin: in fact, the power of fudorific medicines in curing fevers is now acknowledged to be very limited. From an obfervation that fevers frequently fubfided on the appearance of a copious fweat, and an opinion that fome noxious caufe of the fever, a *materies morbi*, was thus evacuated by the pores of the fkin, the old practitioners laboured hard to produce fweating, and, by imitating the procefs of nature, to anticipate her crifis, and aid her efforts in the expulfion of the "peccant humours." But experience has decided that the imitations of art do not produce the fame refults as the fpontaneous operations of the conftitution: a blifter does not fupply the place of an eruption or a boil; a purgative is not equally conclufive in its effects as a fpontaneous diarrhœa; nor does a fudorific draught, with the proper regimen, produce the fame crifis as a natural fweat: inafmuch as thefe fpontaneous difcharges are rather the effects and firft fymptoms of a falutary change in the difeafe, and not the caufes. (See Crisis.) Therefore, when thefe fpontaneous difcharges occur, our duty confifts only in doing nothing that may tend to interrupt them, unlefs where they are obvioufly detrimental. The profufe fweats in hectic fever, for example, and the colliquative, which alternate with them, or that which occurs in the latter ftages of typhus, are of a dangerous tendency, and, therefore, fhould be checked when it is poffible.

The value of the other clafs of diaphoretics, which excite fweat by accelerating the general circulation, fuch as contrayerva and ferpentaria, is to be eftimated, therefore, upon their other properties, the ftimulant and cordial, rather than upon their fudorific powers, in the cure of fevers; and they ought only to be employed in thofe difeafes when debility prevails, in aid of the powers of wine and other ftimulants. In all febrile difeafes connected with local inflammation; as in pneumonia, phrenzy, inflammation of the bowels, liver, or other organs, diaphoretics of this ftimulant nature muft be carefully avoided; fince their mifchievous influence, in accelerating the circulation, would more than counterbalance any advantage which might be received by relaxing the veffels of the fkin. Of all the ftimulant diaphoretics, Dr. Cullen confiders the guaiacum to be one of the moft valuable, as it affords a matter which paffes more entirely to the extreme veffels, and feems to ftimulate the exhalents more in proportion than it does the heart and great arteries. By this means it is both a more fafe and more effectual fudorific than thofe which ftimulate the latter almoft only: but acute rheumatifm, or rheumatic fever, as it is called, is almoft the only acute difeafe in which it can be recommended; and it is a difeafe in which the fweating is fpontaneoufly profufe, and bears ftimulants better than phlegmonous inflammations.

It may be obferved, that the combination of opium with fudorific medicines is valuable in two ways; the opium aids the operation of the fudorific, on the one hand; and, on the other, the fudorific, by determining to the fkin, renders the anodyne effect of the opium more certain and complete, and prevents fome of its unpleafant influence on the head: for opium, given when the fkin is dry, or not accompanied by perfpiration in the courfe of its operation, is very apt to occafion reftleffnefs rather than fleep, and to produce a flight approach to delirium, by its influence on the brain: hence the acknowledged value of the combination which is univerfally known by the name of Dover's powder, as a fafe and active diaphoretic and anodyne; it confifts of opium combined with the diaphoretics, ipecacuanha, and fulphate of potafs.

Diaphoretic medicines have been employed in various other difeafes of a chronic nature: at one period they were believed to have the power of eradicating the venereal difeafe, and the ftimulant fort, fuch as guaiacum, opium, and other vegetable matters. They are allowed to have removed fome of the primary and fecondary fymptoms of lues venerea, and to have alleviated others; and they are deemed capable of removing certain fequelæ of the difeafe, where the farther adminiftration of mercury would prove injurious: but no fatiffactory evidence has been adduced, to prove that any, or all of thefe vegetables, given fingly or combined, are competent to the eradication of lues venerea from the animal body. See John Pearfon's "Obfervations on the Effects of various Articles of the Materia Medica in the Cure of Lues Venerea," p. 234, fecond edition.

Diabetes has alfo been faid to have been cured by the ufe of fudorific medicines. Two cafes of this difeafe are recorded by Dr. M'Cormick of Antrim, in Duncan's Medical Commentaries for 1783, in which the continued ufe of Dover's powder, at bed-time, is believed to have effected a cure: and the adminiftration of the fame powder, conjoined with the ufe of another powerful diaphoretic, the warm bath, was fuccefsfully recommended, in one cafe, by Mr. Werner. See "The London Medical Journal for 1790," p. 221. The natural ftate of the fkin in diabetes is that of extreme drynefs, and diaphorefis is with difficulty produced: but it is reafonable to fuppofe, that, where a free outlet is obtained by the fkin, the difcharge by the kidnies will be diminifhed. It may be doubted, however, whether this change alone can be confidered as a cure of diabetes; fince the conftitutional or organic difeafe, with which it is commonly connected, cannot be removed by fweating.

Diaphoretic *antimony*, or *mineral diaphoretic*, is a preparation of antimony, the procefs whereof fee under Antimony.

DIAPHRAGM, in *Anatomy*, (from διαφραττω, *I divide*,) the mufcle which feparates the two cavities of the abdomen and thorax, and is the chief agent in infpiration. It is alfo known among anatomifts by the names of feptum tranfverfum, feptum mufculare, and in common language, by that of the midriff.

In anatomical defcriptions it is often divided into two parts; which however are fo intimately united, that they form in fact but one mufcle. Thefe divifions are; the *greater diaphragm*, the true feptum, which is a thin, broad, and arched tendino-mufcular expanfion, dividing the cheft from the abdomen: and the *leffer diaphragm* (appendices or crura diaphragmatis), which is connected to the back part of the former, and defcends on the front of the bodies of the lower vertebræ. It is remarkable, as Bifchat has obferved, for the want of fymmetry in its two halves. Parts of the body belonging to the animal functions, and placed in the middle line, are generally fymmetrical; perhaps the deviation from this law in the cafe now under confideration, may be accounted for, according to the remark of that author, by the circumftance of its being connected in great meafure with the organic functions, although it is under the controul of the brain.

Its middle confifts of a large broad and thin aponeurofis, or tendon, ferving as a common point of attachment to all the mufcular fibres, and named the tendinous centre, or central tendon of the diaphragm. This part is the real divifion of the two cavities, and is placed in the centre of the fpace which feparates them. Its figure is fomewhat oval on the lateral afpects; it is contracted into an obtufe end towards the

the front, and is marked by a lunated notch posteriorly. Hence it has an obscure resemblance to the leaf of trefoil, and consists of two lateral portions, named alæ, a right and left; and a middle anterior part placed before and between the two latter. The posterior edge of this tendon is its broadest part, and is placed near to the bodies of the vertebræ: it becomes gradually narrower towards the front, and the obtuse end of this part terminates at a short distance behind the ensiform cartilage. It consists of fibres pursuing very various directions, and connected into fasciculi, which decussate each other: the greater part perhaps goes from the circumference to the centre. The right ala is generally rather larger than the left. From the whole circumference of this tendinous centre the muscular fibres depart in a radiated manner; and they may be divided into three parts: the anterior, the posterior, and two lateral. The front portion consists of a few short fibres, proceeding directly downwards and forwards to be fixed to the posterior surface of the ensiform cartilage. They are often divided into a right and left part, and at the interval between these the cellular substance of the anterior mediastinum communicates with that of the abdominal cavity. Sometimes this part is wanting altogether.

The lateral fibres are the most numerous; they proceed from each side of the tendon, diverge, and describe in their course semicircles with the convexity upwards. They terminate every where at the circumference of the basis of the chest. The most posterior ones are short, and connected with the back division, or crura of the diaphragm: these are inserted in an aponeurosis, extended from the end of the last rib to the transverse process of the first lumbar vertebra, and sometimes called ligamentum arcuatum, although it seems to be merely the upper edge of the aponeurosis of the transversalis. The rest of the lateral fibres which increase considerably in length, are inserted by broad, distinct, and flat, tendinous and fleshy portions on the inner surface of the cartilages of the six last ribs, and in some instances of the bone of the ribs. These attachments meet with similar ones of the transversalis, and there is sometimes a continuity of fibre between the two muscles.

The posterior fibres (lesser diaphragm), arising from the broad back edge of the tendon, constitute a pretty large muscular mass, lying over the bodies of the vertebræ; and formed into two fasciculi, named the crura; of which the right is longest, and lies most on the front; the left is shorter, and placed more to the side of the vertebral column. At the part where they arise from the central aponeurosis they separate, and leave an oval opening, through which the œsophagus and nerves of the eighth pair pass from the chest into the abdomen; this is the cardiac, œsophageal, or superior orifice of the diaphragm. The two crura now descend nearly in a vertical direction, and a fasciculus of fibres is detached from each: these fasciculi cross each other, and complete by their decussation the lower part of the œsophageal orifice, and then join the opposite crura. The anterior, which descends from the left crus to the right, is the most considerable. The two crura, still descending, separate again, and leave a parabolic opening, directly in front of the vertebral column, giving passage to the aorta and thoracic duct, and called the aortic or inferior orifice. They then contract into a flattened tendon, which is inserted in the front and sides of the bodies of the lumbar vertebræ; *viz.* into the two upper ones on the left, and three on the right side, and sometimes into the transverse process of the second. The tendons of the two crura are united in the middle by an aponeurotic arch, which forms the anterior portion of the aortic orifice, and which stretches immediately over that vessel: they are also confused with the longitudinal ligament that extends along the bodies of the vertebræ, so that their extent cannot always be very easily defined. They are more manifest on the posterior than on the anterior surface of the crura.

Parts, which pass through the Diaphragm.

The aorta, thoracic duct, œsophagus, and nerves of the eighth pair come through the openings already mentioned in the crura of the diaphragm. The two apertures which transmit these parts, are rather placed towards the left side of the body, in consequence of the left crus being placed on the left of the vertebral column. The interval between the two crura is divided into the two orifices by means of the decussating fasciculi of fibres: and consequently the aorta and œsophagus are separated from each other by those fasciculi. The œsophageal opening is composed entirely of muscular fibres, and therefore liable to change in its dimensions: the aortic orifice, on the contrary, is never affected, in its diameter: the lower part being formed by the surface of the vertebræ; the sides by the tendons of the crura closely fixed to those bones; and the upper part by the aponeurotic arch joining the two crura. The inferior vena cava goes through a large opening situated on the right side of the central tendon, and possessing a nearly circular outline. It is composed of three lunated fasciculi of fibres; an anterior, a posterior, and a left, which decussate each other, and thereby give something of a triangular figure to the opening. It is placed near the posterior edge of the tendon. It is sometimes made by four fasciculi. The splanchnic nerves, and the trunks of the great sympathetics, go through the crura of the diaphragm separately on each side; and are generally accompanied by the origin of the vena azygos.

The inferior or abdominal surface of this muscle forms a greater or less concavity; always greater on the right side; and less marked in the middle than at the sides. It is covered almost universally by the peritoneum, which adheres to it pretty closely by short cellular threads. Towards the back part on the right side it adheres to the surface of the liver. It is in contact with the liver, stomach, and spleen; and at the lower back part with the renal capsules and kidnies without the intervention of peritoneum. Its superior thoracic surface is regularly convex, but higher on the right than on the left side: the assigned reason for this difference is the situation of the liver. The greatest convexity of the right side is opposite to the fourth true rib, while on the left it is not higher than the fifth. The pericardium is strongly attached to the tendinous centre; which on the front and back part corresponds to the two mediastina. The sides of the diaphragm are every where closely covered by the pleura, and are in contact with the base of the lungs. Some part of the circumference of the muscle corresponds to the inner surface of the false ribs, and the intercostal muscles: and hence a wound of this part might pass through the chest and penetrate the abdomen without wounding any part contained in the former cavity. The convexity of the diaphragm describes an elliptical figure; terminating below by a lunated edge in front, and behind rendered irregular by the descending crura. The dextro sinistral diameter is greater than any antero-posterior measurement. The angle which its surface forms with the spine, is much more acute than that with the sternum.

The pleura and peritoneum nearly touch, or are separated however, only by cellular texture, in some situations of the diaphragm; as at the passage of the vena cava, and at the interval of the anterior fibres.

Action of the Diaphragm.

When this muscle contracts, the convexity of its fibres is destroyed; instead of curved, they now describe straight lines; and the space which is thus gained in the chest, is lost in the abdomen. The contraction of the crura draws down the back part of the tendinous centre, which can descend but little in front, and, when it has thus descended, is fixed by the anterior fibres. The aponeurosis consequently describes a very oblique plane, extended from the ensiform cartilage downwards and backwards. This motion drives the abdominal viscera, and particularly the liver, stomach, and spleen downwards, but principally forwards: thus the ordinary action of the diaphragm is felt but little at the lower part of the abdomen, while the anterior parietes of the cavity are pushed forwards by the impulse communicated to the viscera. If the abdominal muscles, instead of yielding, contract upon the viscera, the effects of the diaphragm's action are particularly felt about the pelvis, as in expelling the urine, fœces, and child in the act of parturition. The chest is enlarged by the diaphragm in the perpendicular direction, and also laterally at its lower part. When it acts gently, the middle tendon, connected with the pericardium, does not descend much; yet it does descend, as any person may easily ascertain by feeling the pulsation of the heart, and then drawing in his breath, when the beating manifestly changes its situation, by becoming lower. In more forcible contractions, this part descends further, and Haller speaks of its becoming even convex towards the abdomen, in experiments on animals. After exerting its full effect in rendering its fibres straight, or if it could not depress the central tendon, it would draw the ensiform cartilage and the lower ribs inwards.

Its action has no effect upon the aorta, as the sides of the opening, through which that vessel passes, are unyielding, and incapable, by their very structure, of change in diameter. Neither is the return of the blood to the heart through the inferior vena cava affected, as this opening is tendinous, and the fibres draw from all sides. But the œsophageal opening is very effectually constringed, since its sides are entirely muscular and moveable; we have the power, by means of the will, of closing the cardia so as to prevent unpleasant eructations. When the muscle has relaxed, the abdominal muscles, by their action, replace the viscera, and restore the diaphragm to its former convexity.

The action of the diaphragm is much affected by the state of mind: hence arise laughing, crying, sighing, &c., which are so many modes of respiration produced by different mental affections. This connexion appeared so strong to the ancients, that they distinguished the diaphragm by the same word that signifies mind, *viz.* φρην; and the adjective *phrenic* derived from that source is still applied to parts which belong to the diaphragm. It is also considerably influenced by the stomach; and hence arise the phenomena of hiccoughing.

For further remarks on this subject, see Respiration. For views of the diaphragm, consult Albinus, Haller "Nova Icon Septi Transversi." Gotting. 1741.; and the "Tabulæ Posthumæ" of Santorini, tab. x. See also the descriptions of the same authors, and those of Soemmerring and Bichat in their systems of anatomy.

Diaphragm is used for the septum scroti. See Scrotum.

Diaphragm is also a general name, given to all partitions, or separations between two parts of a thing; as the little perforated partitions in the tubes of long telescopes.

DIAPHRAGMATIC, an epithet applied to parts belonging to the diaphragm: thus, there are the diaphragmatic arteries, nerves, &c. It has the same meaning as the term phrenic.

DIAPHRAGMITIS, in *Medicine*, the nosological term for an inflammation of the diaphragm, or rather of that part of the pleura, or lining membrane of the chest, which is spread upon the diaphragm.

The membranous and muscular curtain which separates the lower viscera from those of the breast, being called by the ancients *diaphragma* and *phrenes*, the inflammation of it has received various denominations. Hippocrates, Ægineta, &c. mention the disease under the term *phrenitis;* intimating at the same time that there are other kinds of the disease, but that the first is to be treated like a peripneumony. But to distinguish this, from the proper phrensy, also called phrenitis, consisting of inflammation of the brain, Boerhaave, and others, have called the disease in question *paraphrenitis;* and Sauvages has given it a place in his Nosology, under the title of *paraphrenesis*. See Van Swieten Comment, ad. § 907. Sauvage Nosol. Method, class 3. gen. 12.

This inflammation has generally been described by writers as a very formidable disease, and distinguished by some peculiar symptoms of great severity. Thus Boerhaave enumerates its symptoms: "A *paraphrenitis* is known by an acute continual fever, with an ardent or inflammatory pain of the affected part of the diaphragm, which, in consequence of its nervous membranes, can hardly bear it; and this pain is greatly increased by inspiration, coughing, sneezing, filling the stomach, reaching, vomiting, compressing or straining of the belly at stool, or in discharging the urine; the breathing is hereby rendered high up in the breast, small, quick, and suffocative; performed by the ribs or breast only, while the abdomen continues inactive; there is a constant delirium; a drawing inwards of the hypochondria; a sardonic or convulsive laugh; a convulsion, a raving, and a gangrene." Aphorism 909.

Now it is acknowledged by all the writers, that this disease consists of an inflammation of the pleura, extended over the diaphragm: *i. e.* of the same membrane which is affected in pleurisy; and therefore ought only be considered as a variety of the latter. In fact, if the muscular part of the diaphragm is ever affected with acute inflammation, it is at least an extremely rare occurrence, and morbid anatomists have not pointed out its existence, as connected with any peculiar set of previous symptoms. But the pleura is frequently found to have suffered inflammation, which has not extended to the muscular substance, contiguous to it underneath. In these cases Dr. Cullen maintains, and we believe he is fully supported by the experience of others, that the symptoms do not differ from those of pleurisy; he affirms that in his long practice he never witnessed the occurrence of the sardonic laugh connected with pleuritic symptoms; and that delirium often accompanies other forms of inflammation of the lungs and their membranes, depending, it would seem, rather on the high degree of fever, and of the phlogistic diathesis accompanying them, than upon the particular part of the membrane, which is inflamed. The most important consideration, however, is, that it is agreed by those who have given the most opposite opinions of the peculiarities of the disease, that it must be treated like the various forms of pneumonic inflammation. See Van Swieten, loc. cit. Cullen, Nosol. Method. gen. 11. spec. 2. *note.*

DIAPHTHORA, from διαφθειρειν, *to corrupt*, is used by Galen and Boerhaave, to denote the corruption of the aliments in the stomach, and by Hippocrates for the corruption of the fœtus in the womb, and abortion.

DIAPNOICA, in the *Materia Medica*, a term ftrictly employed to denote the quality of medicines, which operate by producing a very gentle exhalation from the fkin; it is, therefore, nearly fynonymous with *Diaphoretica*, except that this laft term is ufed to denote the production of more copious degrees of perfpiration. The word is from Διαπνέω, *perfpiro*. See DIAPHORETIC.

DIAPORESIS, Διαπορησις, in *Rhetoric*, is ufed to exprefs the hefitation, or uncertainty of the fpeaker.

We have an example in Homer, where Ulyffes, going to relate his fufferings to Alcinous, begins thus:

"Τι πρωτον, τι δ' ἔπειτα, τι δ' ὕστατιον καταλεξω?"

"Quid primum, quid deinde, quid poftremo alloquar?

This figure is moft naturally placed in the exordium or introduction to a difcourfe. See DOUBTING.

DIAPRE', or DIAPERED, in *Heraldry*, a dividing of a field into planes, or compartments, in the manner of fretwork; and filling it with variety of figures.

This chiefly obtains on bordures, which are diapered, or fretted over, and the frets charged with things proper to bordures.

DIAPRUNUM, in *Pharmacy*, the name of a compound electuary, of which the pulp of the Damafcene prune was the bafe. It is entirely obfolete.

DIAPSALMA, διαψαλμα, has been fuppofed by fome commentators of the Pfalms to be equivalent to the unintelligible Hebrew word *Selah*.

The import of thefe words being generally obfcure, the referring the readers from one to the other, is neither untying the knot, nor cutting it, but pulling it tighter. The true fignification of this word is extremely uncertain; according to St. Auguftin, diapfalma means a reft, or paufe: interpofitum in canendo filentium: and Theodoret Prefat. in Pfalm. fays: "Diapfalma igitur videtur mihi inuere—cantus viciffitudinem: a change of key in the mufic, or meafure in the verfe. St. Jerom: that it was an indication of a new fubject in the poetry, or the mufic. Padre Martini Storia della Muf. i. 50.

DIAPTOSIS, a term in ancient Greek mufic, to exprefs a fmall fucceffive fall, and rife, and likewife in canto fermo, by the moderns: as C B C or E D E.

DIAR, in *Geography*, a town of Perfia, in the province of Chorafan; 100 miles N.N.E. of Herat.

DJAR, a fmall port of the Red fea, whofe entrance is at the N.E., about 3 fathoms deep throughout, unlefs juft upon the fouth-fide, and perfectly fheltered from any wind. N. lat. 23° 36′ 9″.

DIARBEK, or DIARBEKIR, a city of Afiatic Turkey, and capital of a province of the fame name, is fituated on a delightful plain, near the weft bank and head of the Tigris, and was formerly called *Amid*, and by the Turks Kara-Amid, or *Karamed*. (See AMID.) It is well fortified, being encompaffed with a double wall, flanked with 72 towers, and one of the moft populous and commercial towns of Afiatic Turkey. In Diarbek are two or three ftately piazzas, or market places, well ftored with all kinds of rich merchandize, and a large magnificent mofque, formerly a Chriftian church. Its chief manufacture confifts in the dreffing, tanning, and dyeing of goat fkins, commonly called Turkey leather, of which it has a very great vent in many parts of Europe and Afia: befides this, there is another of dyed fine linen and cotton cloths, which are nearly as much valued. It is faid to contain no lefs than 20,000 Chriftians, two-thirds of whom are Armenians, and the reft Neftorians or Jacobites, together with fome few of the church of Rome. This place is much frequented by pilgrims of all nations and religions, and has, on both fides of the river, accommodations for the caravans that go to or from Perfia. Females enjoy in this town a great degree of liberty, and are commonly feen in the public walks, in company with the Chriftian women, with whom they live on terms of familiarity and friendfhip; and the men are polite, affable, and courteous. The city is under the government of a pacha, whofe dominions and power are very extenfive; and he has commonly a body of 20,000 horfe under his command, for repelling the frequent incurfions of the Curds and Tartars, who go out on horfeback to rob the caravans. The adjacent territory is rich and beautiful; the bread, wine, and flefh excellent; the fruits exquifite, and the pigeons better and larger than any in Europe. It is diftant about 155 miles from Aleppo, 600 miles N.W. of Ifpahan, and 540 E.S.E. of Conftantinople. N. lat. 37° 54′. E. long. 39° 24′.

DIARBEKIR, DIARBECKR, or *Diarbeck*, a province of Afiatic Turkey, which, in its largeft extent, comprehends the province of Diarbekir, properly fo called, Yarack, and Curdiftan, which were the ancient countries of Mefopotamia, Chaldæa, and Affyria, with Babylon. Its name is derived from *dhyar*, a duke, and *bekr*, country, and denotes the duke's country. It extends along the banks of the Tigris and Euphrates from N.N.W. to S.E.; that is, from mount Taurus, which divides it from Turcomania on the north, to the inmoft recefs of the Perfian gulf on the fouth, about 600 miles; and from eaft to weft, that is, from Perfia on the eaft, to Syria and Arabia Deferta on the weft, in fome places 200 and in others about 300 miles; but in the fouthern or lower parts, not above 150. As it extends from the 30th to the 38th degree of latitude, its air is temperate; and its foil is rich and fertile. Almoft the whole courfe of the Euphrates and Tigris lies through this country.

Diarbeck Proper is bounded on the N. by Turcomania, on the W. by Syria, on the S. by part of Arabia Deferta and Irac Proper, and on the E. by Curdiftan. It was the Padan-Aram of Mofes, the latter being the general name of Syria, and the former fignifying fruitful, which epithet is peculiarly applicable to this country, as it yields corn, wine, oil, fruits, and all neceffaries of life in great abundance. The government, under a begler-bey, is divided into 19 fangiacats, and 5 other diftricts, called "Hakinmet," which are free. Eleven of the fangiacats belong to the Turks, and 8 in Curdiftan, which acknowledge the grand Signor, but whofe chiefs are hereditary. The principal towns are Diarbek and Moful.

DIARIA, in *Medicine*, the term given by the Latins to a fhort fpecies of fever, which is frequently begun and terminated within the courfe of twenty-four hours. It is the fame with the EPHEMERA of the Greeks, which fee.

DIARPA, in *Ancient Geography*, a town of Afia, in Armenia.

DIARRHODON, in *Pharmacy*, a name formerly given to feveral medicines, of which rofe-leaves were the chief expedient.

DIARRHŒA, in *Medicine*, from διαῤῥέω, *perfluo*, *I flow through*, in popular language, *loofenefs*, *purging*, a difeafe confifting in more frequent and more liquid evacuations by ftool, than is ufual.

This leading and characteriftic fymptom is fo diverfified in its degree, in its caufes, and in the variety of matter evacuated, that it is almoft impoffible to give any general hiftory of the difeafe: and it not only varies greatly, as in idiopathic affection, but is a common or accidental attendant upon many diforders, both acute and chronic, general and local. Hence in order to decide upon its nature, and more particularly

particularly to direct its treatment with propriety and fuccefs, it is obvioufly neceffary to inveftigate its rife, progrefs, duration, or recurrence, its preceding and accompanying fymptoms, and its affigned or probable caufes, with minutenefs and accuracy. The difeafes which refemble diarrhœa, in the leading characteriftic, are dyfentery, and cholera; but they differ effentially.

Diarrhœa is to be diftinguifhed from dyfentery, by being generally without fever, and by the alvine evacuations confifting of the natural fæculent matter, though in a more liquid ftate; and by the abfence of *tenefmus*, or violent bearing down, which attends dyfentery. There is alfo in the latter diforder more fevere griping, than in diarrhœa, but this occafionally occurs in the diarrhœa, and therefore is not a decifive diftinction. There is, however, a mutual alliance between the two difeafes, which occafionally pafs into each other; a diarrhœa, if neglected or improperly treated, fometimes being converted into dyfentery; and a dyfentery, when its worft fymptoms have been fubdued, fometimes leaving a diarrhœa behind. Dr. Cullen mentions the contagious nature of the dyfentery, as another diagnoftic fymptom, but, in this country, and in fporadic cafes particularly, the dyfentery is not contagious. See DYSENTERY.

A diarrhœa is to be diftinguifhed from cholera chiefly by the difference of their caufes, which, in cholera, are of one peculiar kind, namely, a profufe overflow of bile; but in diarrhœa, greatly diverfified. Hence the evacuations in the diarrhœa are very various; in cholera they confift chiefly or folely of bilious matter, which is copioufly difcharged by ftool, and alfo thrown upwards by vomiting. See CHOLERA.

The varieties in the colour, fmell, and appearance of the dejections in diarrhœa, have not only given origin to particular denominations for certain forms of the difeafe, but they alfo afford very important inftruction to the practitioner in his enquiry into their peculiar feat and caufe. Thus, when the ftools are of the proper ftercoraceous quality, the diarrhœa, which often arifes from an overgorging of the ftomach with too much food, has been termed diarrhœa *crapulofa*. When the food paffes off by ftool in an undigefted ftate, it is termed D. *lienteria*; this has been confidered by moft writers as a diftinct difeafe, but Dr. Cullen has juftly deemed it a variety of diarrhœa. The fame obfervation applies to the D. *cœliaca*, or cœliac paffion, when the ftools are of a milky appearance, and are fuppofed to confift chiefly of chyle, which paffed the mouths of the lacteals without being abforbed. When the ftools confift of a confiderable portion of a glairy mucus, the D. *mucofa* or *pituitofa* is faid to exift: the fecretion of the mucus of the inteftines is particularly augmented by acrid fubftances paffing through them, fuch as draftic cathartics, and alfo by the external application of cold, efpecially to the feet. When very watery and thin, the D. *colliquativa* is produced; when black, the *melœna*, &c. See DEJECTION.

The effential part of this difeafe, then, confifts in a preternatural increafe of the periftaltic motion, and of the fecretions, in the whole or a great part of the inteftinal canal; and the predifpofing caufe of the difeafe, is a peculiar irritability of the inteftines, and of the fecreting veffels which open upon their internal furface.

The feveral exciting caufes of diarrhœa may be referred to two different claffes. The firft comprifes diforders of certain parts of the body, which, either from a fympathy of the inteftines with thefe parts, or from their connection with the fyftem at large, occafion an increafed action of the inteftines, without the transference of any ftimulant matter from the primary difeafed part to them. Thus, the general fympathy of the inteftines is often manifefted in perfons under the influence of certain paffions of the mind, as anger, fear, and fome others, which occafionally excite a diarrhœa. And among the difeafes of other parts of the body, which affect the inteftines, the irritation of dentition, in infants, may be mentioned as a familiar illuftration, as it is feldom difficult and painful without occafioning diarrhœa. The fympathy between the fkin and the bowels is particularly great in many individuals, fo that a chill, or the application of cold and moifture, efpecially to the feet, will generally excite a diarrhœa: and the fame fympathy is fhewn in others, by the occurrence of diarrhœa from the fuppreffion of cutaneous eruptions, or the ftopping of profufe or habitual difcharges from fores, &c.

The fecond clafs of occafional caufes of the increafed action of the inteftines, confifts of the ftimuli which are applied directly to the inteftines themfelves; and thefe are of various kinds. They may be fubftances introduced by the mouth; or poured into the inteftines by the feveral excretories opening into them; or poured from certain preternatural openings made into them in certain difeafes.

Of the irritating matters introduced by the mouth, the aliments commonly taken in are the firft to be mentioned; for, although when properly digefted, they are reduced to a bland and unftimulating matter; yet when too great a quantity is taken, fo as to load the ftomach, and prevent their due digeftion, they are fent in a crude and irritating ftate to the inteftines, and, ftimulating the excretories and the furface as they pafs along, they excite a diarrhœa, by which the conftitution rids itfelf of the irritation. Various fubftances are often mixed with the aliment, or taken as food, which are of a ftimulant nature to the inteftines, although taken in moderate quantity; fuch as acefcent fermenting liquors, vegetable acids, crude and four fruits; even the faline and faccharine parts of the food, if taken in an over-proportion, will excite diarrhœa. There are alfo peculiar idiofyncrafies in fome individuals, in whom particular articles of food, which are altogether inoffenfive to people in general, excite diarrhœa whenever taken. A fudden change of the diet, as from animal to vegetable matters, and the contrary, is liable to occafion diarrhœa; as is alfo a change in the water, or bread, to which we have been accuftomed.

The other matters introduced by the mouth, which may be the caufes of diarrhœa, are thofe which are taken as medicines, poffeffing the faculty of ftimulating the alimentary canal. Thus in the lift of the Materia Medica, we have a long catalogue of thofe, named cathartics, or purgatives. Thefe, given in a certain quantity, occafion a temporary diarrhœa, and given in very large dofes, or even moderately in very irritable habits, they may produce it in excefs, and continue it longer than the ufual time, producing that fpecies of diarrhœa, named a *hypercatharfis*.

The matters poured into the cavity of the inteftines, from the excretories opening into them, and which may occafion diarrhœa, are either thofe from the pancreatic and biliary ducts, or thofe from the excretories in the coats of the inteftines themfelves. The changes in the pancreatic fecretion cannot be exactly afcertained; but it is probable that a morbid and acrid fluid may iffue from it, even while ftill entire in its ftructure, but more efpecially when it is in a fuppurated, fchirrous, or cancerous ftate, and occafion diarrhœa. We know well, that the bile is often poured out from the biliary duct, both in greater and leffer quantity than ufual, and diarrhœa is often the confequence of both; nor can it be doubted, that the bile is often poured out much changed in its qualities, if the condition of the ftools can be affumed as affording evidence of fuch change. (See DEJECTION.)

Where

Where the bile is increafed in quantity, and the ftools are extremely yellow with bilious matter, the diarrhœa, thus occafioned, muft be confidered as a gentle cholera, differing from this difeafe only in the leffer degree of its fymptoms; and in hot weather, fuch a diarrhœa *biliofa* is not uncommon. But befide bile, varying in quantity and quality, the biliary duct may pour out *pus*, or other matter, from abfceffes in the liver, which may be the caufe of a diarrhœa. Some practical writers take notice of a diarrhœa, in which a thin and bloody liquid is difcharged; which they fuppofe to have proceeded from the liver, and have therefore given the difeafe the name of *hepatirrhœa;* but it is at leaft a very rare occurrence. The black difcharge by ftool, termed *melæna*, which confifts principally of imperfectly coagulated blood, fometimes, without doubt, proceeds from the liver; but occafionally from the furface of the inteftines themfelves, as mentioned in the article laft referred to.

A fecond fet of excretories, from which matter is poured into the cavity of the inteftines, comprehends thofe from the coats of the inteftines themfelves; which are either the exhalant extremities of the arteries, or the excretories from the mucous follicles; both thefe fources occur in prodigious number over the internal furface of the whole inteftinal canal. It is probable that it is chiefly the effufion from thefe fources, which, in moft inftances, conftitutes the liquid matter of the ftools occurring in diarrhœa. The effufion from thefe excretories may be increafed, not only by the increafed action of the inteftines from the ftimuli before mentioned, but alfo from an increafed afflux of fluid from other parts. Thus when the fuperficial veffels are contracted by external cold, a greater quantity of fluids may be determined to the inteftines. In like manner ferum or other fluids may be abforbed from the cavities in which they have been ftagnant, and be poured into the inteftines, as frequently happens in particular in dropfies. Cullen, Firft Lines, § 1483.

A third fource of matter, poured into the cavity of the inteftines, and producing diarrhœa, is from thofe preternatural openings, occafioned by difeafes in the inteftines or neighbouring parts. Thus the blood veffels on the internal furface of the inteftines may be opened by erofion, rupture, or anaftomofis, and pour into the cavity their blood, which, either by its quantity, or by its acrimony, whether inherent or acquired by ftagnation, may give rife to a diarrhœa, evacuating bloody matter. In this way, the *melæna* or *morbus niger*, before-mentioned, is fometimes produced. The rupture of abfceffes, feated in the coats of the inteftines themfelves, or in the contiguous vifcera, which, during the inflammatory ftate, had formed adhefions to the inteftines, may likewife occafion a diarrhœa, in which purulent or fanious matter, mixed with more or lefs blood, will be difcharged.

Diarrhœa, in one or other of the forms above defcribed, not only occurs alone, as an idiopathic difeafe; but it alfo accompanies from time to time many other difeafes, of which it becomes a prominent fymptom, and in which it fometimes proves critical and falutary, but often fo much the contrary, as to demand particular attention. In fevers, for example, it is not an uncommon occurrence, and if it appears late in the difeafe, when the debility is great, it is often a very unmanageable and dangerous fymptom. After the meafles a diarrhœa frequently appears, and is often falutary; but in many inftances it has proved more fatal than the difeafe itfelf, as is faid to have been the cafe in the fatal epidemic meafles in the ifland of St. Helena, in the year 1807. Diarrhœa is one of the moft common diforders attendant on difficult dentition in children; in fact, almoft every irritation which excites feverifhnefs in young children, is apt to occafion diarrhœa. It is likewife a fymptom of the prefence of worms in the inteftines, which animals ought, perhaps, to have been enumerated among the morbid ftimuli of the inteftines, before detailed. In the laft ftage of pulmonary confumption, a colliquative diarrhœa, which is liable to alternate with the colliquative fweats, is an almoft univerfal occurrence.

Our judgment as to the event of this diforder, thus various in its nature and caufes, muft be deduced from a confideration of the age, conftitution, and previous ftate of health of the patient; from the affignable caufes of the difeafe, its duration, its concomitant fymptoms, and its effects upon the general habit, and likewife from the operation of the remedies already employed.

Cure.—In confequence of this great variety in the nature of the difeafe, the method of treatment in diarrhœa muft be neceffarily various; in many cafes, it can only be palliative; and where the difcharge is obvioufly falutary, it muft be encouraged under proper regulations. As it confifts effentially of a preternatural increafe of the periftaltic motion, and of the fecretory actions of the inteftines; fo the leading indications of cure will turn upon one or other of the following circumftances: whether it appear to arife from 1. A morbid irritability of the inteftines; 2. A preternatural ftimulus applied to them; or, 3. A combination of thefe two. The *firft* indication will require the irritability to be allayed; the *fecond*, that the offending matter be expelled, or its acrimony corrected; and the *third* will demand a mixed plan, confifting of the other two, either jointly or alternately, together with an attention to the ftate of other functions and organs, which may affect that of the *primæ viæ*.

The means adapted to fulfil the *firft* indication, or to allay the morbid irritability of the inteftines, will confift in the adminiftration of opiates; and of aftringents, fuch as the Catechu, Hæmatoxylon, or logwood, and Kino; the tonic bitters, fuch as Colombo, Simarouba, and others of that clafs. "There has been fome hefitation," fays Dr. Cullen, "about the employment of aftringent medicines, in recent cafes, upon the fuppofition that they might occafion the retention of an acrid matter that fhould be thrown out. I cannot, however, well underftand, or affign the cafes, in which fuch caution is neceffary; and I think that the power of aftringents is feldom fo great as to render their ufe very dangerous. The only difficulty which has occurred to me, with refpect to their ufe, has been to judge of the circumftances to which they are efpecially adapted. It appears to me to be only in thofe cafes, where the irritability of the inteftines depends upon a lofs of tone: and this I think may occur either from the debility of the whole fyftem, or from caufes acting on the inteftines. All violent or long continued fpafmodic and convulfive affections of the inteftinal canal neceffarily induce a debility; and fuch caufes often take place, from violent irritation in colic, dyfentery, cholera, and diarrhœa. The fame objection," Dr. Cullen adds, "has been made to the ufe of opiates, in recent cafes of diarrhœa, as to that of aftringents; but on no good grounds: for the effect of opiates, as aftringent, is never very permanent; and an evacuation, depending upon irritation, though it may be for fome time fufpended by opiates, yet always returns very foon. It is only by taking off irritation that opiates are ufeful in diarrhœa; and, therefore, when the difeafe depends upon an increafe of irritability alone, or when, though proceeding from irritation, that irritation is corrected or exhaufted, opiates are the moft ufeful and certain remedy. And though opiates are not fuited to correct or remove an irritation applied, they are often of great benefit in fufpending the effects of that irritation, whenever thefe are violent: and, upon the whole, it will appear, that opiates may be very frequently, and with great propriety, employed in the cure of diarrhœa."

hœa." Firft Lines, § 1502-3. In the cafes of *lientery*, of the diarrhœa *mucofa*, efpecially when it has arifen from acrid purgation, conftituting a *hypercatharfis*, and in all inftances of colliquative diarrhœa, the adminiftration of opiates is obviously requifite, and we apprehend there is no room for diverfity of opinion on the fubject; and thefe are the principal modifications of diarrhœa, to which this indication is applicable.

The means adapted to fulfil the *fecond* indication, of removing a preternatural ftimulus from the inteftines, confift in the adminiftration of evacuants, or correctors of acrimony. Hence the ufe of emetics, of purgatives, of glyfters, with the one view; and of mucilaginous diluents, alkalies, abforbents, antifeptics, with the other.

As indigeftion and crudities prefent in the ftomach, are frequently the caufe of diarrhœa, fo emetics have often been found ferviceable in this complaint. Their utility may alfo extend, perhaps, beyond the mere evacuation of the ftomach, as vomiting may occafion fome inverfion of the periftaltic motion, which is determined too much downwards in diarrhœa. But purging has been fuppofed more neceffary, to remove the crudities that have paffed into the bowels, and it is an almoft univerfal practice among the people at large, to give a purge for the cure of a diarrhœa. But this practice, in the opinion of that able phyfician, whofe name we have fo often had occafion to quote, we mean Dr. Cullen, is founded on very miftaken notions refpecting the difeafe, and feems to be for the moft part fuperfluous, and in many cafes hurtful. It refts upon the fuppofition of an acrimony prefent in the inteftines, that ought to be carried out by purging. But from whatever fource the acrimony, which can excite a diarrhœa, arifes, it may be fuppofed, he fays, fufficient to evacuate itfelf, fo far as that can be done by purging; and as in cholera, fo in the fame kind of diarrhœa, it will be more proper to affift the evacuation by diluents and demulcents, than to increafe the irritation by purgatives.

This opinion is extremely rational, and, when merely oppofed to the indifcriminate ufe of purgatives in diarrhœa, its juftnefs is undeniable. But we believe, that, in avoiding one extreme, the profeffor has given a fanction to another. In a recent cafe of idiopathic diarrhœa, fuch as the *crapulofa*, or that from cold, a gentle purgative is feldom, if ever, in the flighteft degree hurtful; it expedites the irritating fordes from the bowels, which, however plaufible the fuppofition of their invariably purging off themfelves, we believe are frequently found, in fact, to be imperfectly carried off, and to remain partially behind, keeping up a degree of irritation, which continues the diarrhœa, and even converts it into dyfentery. Wherever any material degree of tenefmus is obferved, a purgative is generally indicated, and, if the bowels be very irritable, its irritating quality may be diminifhed by combining a fmall dofe of an opiate with it.

The acrimony, which excites diarrhœa, efpecially in children, is moft commonly of an acid nature, and is generated in the ftomach, during the imperfect digeftion of the food. Alkaline and abforbent medicines tend to neutralize it, and therefore to remove the irritation of this acrimonious caufe of diarrhœa. Antifeptics have been recommended, for the purpofe of correcting a putrid acrimony in the inteftines, in malignant fevers. The theory is queftionable; but thofe antifeptics which are at the fame time powerful cordials and ftimulants, fuch as wine, and alcohol, are ufeful auxiliaries in removing fuch a diarrhœa, together with other fymptoms of thofe fevers.

When the *third* indication occurs; when there is, at the fame time, a morbid irritability of the inteftines, and an unufual ftimulus applied to them, the latter muft be removed or corrected, where that is practicable, by evacuants or other means, and the irritability moderated. Abforbents, fuch as preparations of chalk, teftaceous powders, lime-water taken with milk, will tend to correct any acid acrimony, that may be formed in the canal; while gentle laxatives may be combined with them, fuch as rhubarb. Thefe are principally indicated in cafes of chronic diarrhœa, in debilitated habits. A determination of the fluids to the fkin, by diaphoretics, by warm bathing, by reftoring fuppreffed difcharges, or fubftituting fuch as may be equivalent, by warm clothing, friction, and the exercife of geftation, will aid in fulfilling this indication; efpecially in cafes where the occurrence of diarrhœa is obvioufly connected with the application of cold, the fuppreffion of cutaneous excretions, or with a generally debilitated habit. This purpofe is alfo more effectually accomplifhed, when a courfe of fuitable diet is purfued at the fame time; efpecially the ufe of milk, rice, the amylaceous parts of vegetables, fuch as arrow root, tapioca, fago, &c. with animal broths and jellies. Dr. Heberden recommends the combination of fpices with the vegetable mucilages, as the nutmeg, cinnamon, &c.; or the combination of cretaceous medicines, with the fpices, and opiates. He alfo advifes the ufe of a fpoonful of mutton fuet diffolved in four ounces of warm milk, twice a day, both as medicine and nutriment to a patient under chronic diarrhœa. See Commentarii de Morb. Curatione, p. 128. A fimilar remedy was recommended by fir John Pringle in the diarrhœa which fucceeds to dyfentery. Dis. of the Army.

Diarrhoea, in *Ancient Geography*, a port of Africa, in the Cyrenaica. Ptolemy.

DIARTHROSIS, in *Anatomy*, is a general term applied to all thofe conjunctions of bones, which are capable of motion. The various fpecies of diarthrofis are named according to the figure of the united furfaces; or the degree of motion which they are capable of performing. 1. D. *planiformis;* in which the oppofed fuperficies are nearly plain; *e. g.* in the oblique proceffes of the vertebræ, in the articulations of the carpus, tarfus, &c. 2. D. *orbicularis;* where a rounded head of one bone is received into a cavity of another. Of this there are two kinds; *enarthrofis*, where the head is large, and the cavity deep; as in the hip joint, which is the only fpecimen in the human body: *arthrodia*, where the convexity and concavity are not fo confiderable, as in the fhoulder, lower joints, &c. The diftinctions arifing from the extent of motion performed are; 1. D. *laxa*, which admits of diftinct motion, and *ftricta*, in which the motion is very obfcure. The diarthrofis planiformis is in all cafes of the latter defcription; while the D. orbicularis may belong to either kind. The joints of the atlas and occiput, of the ribs and vertebræ, malleus and incus, &c. are cafes of D. orbicularis ftricta; *i. e.* the joint is formed by a convex head of bone received into a cavity of the other, and the motion allowed of is fmall in extent. Thofe examples of D. laxa, in which the bones admit only of flexion and extenfion, conftitute the fpecies *ginglymus*, or hinge-like joint: as in the elbow, fecond and third joints of the fingers, &c. In other inftances one bone can move in a circular direction on the other; and this is called D. trocho-eides; it is exemplified in all the arthrodia articulations.

DIARY, a term fometimes ufed for a journal, or day-book, containing an account of every day's proceeding. Thus we fay diaries of the weather, &c.

Diary *Fever*, is a fever of one day. See Diaria, and Ephemera.

DIAS, in *Ancient Geography*, a town of Afia Minor, in Lycia. Steph. Byz.

DIASCHISMA, in *Ancient Mufic*, an interval confifting of half a femitone minor. It is an interval fo called by Pythagoras, Overend, &c. its ratio is $\frac{524.288}{531.441}$ and is the comma maximum or comma of Boetius, the ancient comma, and the quint-wolf of earl Stanhope; it is the difference between

the apotome and limma, its common logarithm being .9941148,6097, and in the logs. of Euler .0195500, being that decimal part of an octave: it is equal to 12 fchifmas and a minute, or $12\,\Sigma + m$. This interval may alfo be compofed by the following additions of intervals, *viz.* fchifma and a major comma: or two fchifmas and a minor comma. The following differences of intervals alfo produce the diafchifma, *viz.* two minor commas from a femitone minimum; a minor comma from two major commas; a tone major from two apotomes; two limmas from a tone major; a medius refidual from an hyperoche; three minor commas from two enharmonic diefes; four enharmonic diefes from three femitones minimum; a femitone minimum from four major commas; an octave from fix tones major; feven octaves from 12 major fifths; five octaves from 12 minor fourths; and 5 major fifths from feven minor fourths. The three laft give us practicable methods of tuning a diafchifma upon an organ, &c., which interval is the *leaft fum* that the temperaments of all the minor fourths, and all the temperaments of the major fifths, can amount to, in any douzeave or fyftem of 12 notes in the octave.

Diaschisma of Euler, is the minor comma, $\frac{2025}{648}$, $= 10\,\Sigma + m$. See Comma minor: this is alfo the major diefis of Maxwell.

Diaschisma of Dr. Bufby (Mus. Dict.) is an interval, the half of the minor femitone, $= 18\,\Sigma + \frac{1}{2}m + 1\frac{1}{2}m$, which exceeds $1\frac{1}{2}$ times the true diafchifma by $\frac{1}{2}f$.

Diaschisma of Boethius, is an interval equal to half a limma $= 23\,\Sigma + \frac{1}{2}f + 2\,m$; this interval has alfo been called by the fame author the half diefis, or femitone minor.

DIASCORDIUM, in *Pharmacy*, a kind of electuary, firft defcribed by Fracaftorius, and denominated from fcordium, which is a chief ingredient therein. It is alfo called confectio Fracaftorii.

The other ingredients are red rofes, bole, ftorax, cinnamon, caffia lignea, dittany, tormentil roots, biftort, gentian, galbanum, amber, terra figillata, opium, long pepper, ginger, mel rofatum, and Malmfey wine.

DIASEBESTEN, a purgative electuary, made with fcbeftens and other ingredients, but now obfolete.

DIASENNA, a foft, purgative electuary, thus called from fenna, which is its bafe.

The other ingredients are fugar-candy, cinnamon, lapis lazuli, filk, cloves, galanga minor, black pepper, nardus Indica, feed of bafilicum, flowers of cloves, cardamoms, faffron, ginger, zedoary, rofemary flowers, long pepper, lapis Armenus, and honey.

DIASHENKIR, in *Geography*, a town of Afiatic Turkey, in the province of Caramania; 6 miles N. W. of Kir-Shehr.

DIASIA, Διασια, in *Antiquity*, a feftival at Athens in honour of Jupiter, furnamed Μειλιχιος, i. e. the *propitious*. Pott. Archæol. lib. ii. chap 20.

DIAST, in *Geography*, a town of Egypt; 3 miles N. of Manfoura. This fmall town is a day's journey diftant from St. Gemiane, where the Copti go in pilgrimage. At the time of that feftival the plain is covered with tents. The Chriftians and Mahometans promifcuoufly rejoice together for eight days. They have horfe-races; the dancing girls affemble in great numbers; and Bacchus and Venus prefide at the entertainment.

DIASTASIS, from διιστημι, *I fet apart*, a word ufed by the writers in *Medicine* in many different fenfes. It is frequently ufed as a name for that feparation of the bones, when they naturally recede from one another. Sometimes it is ufed as the term for an interftice, as that between the ulna and radius, or between the tibia and fibula. Sometimes it is put for a diftention of the mufcles in convulfions; and, when applied to the ftomach, it is made to fignify an inclination to vomit.

DIASTEM, Diastema, in *Mufic*, a name the ancients gave to a fimple interval, in contradiftinction to a compound interval, which they call a fyftem.

Ariftoxenus enumerates many differences of intervals: fuch as greater or lefs; confonant or diffonant; compounded or uncompounded; related to one genus or to another; laftly, rational or irrational. Ariftox. ap. Wallis. Append. ad Ptolem. Harmon. p. 154.

Muficians divide intervals into two kinds: one of them called fyftem, which is to contain at leaft two intervals in any kind of mufic whatever; but may contain more. The other, called diaftem, is a mere, or fingle interval; the proper fignification of the Greek διαστημα being *interval.*

DIASTOLE, in *Anatomy*, (from διαστελλω, *I feparate*,) is the dilatation of the cavities of the heart, or of the arteries, by the influx of blood *feparating* their fides, which were previoufly in contact. It is oppofed to *fyftole* or the contracted ftate of the fame cavities and tubes. See Circulation.

Diastole, in *Grammar*, a figure whereby a fyllable naturally fhort is made long.

Thus it is that Virgil begins a verfe with the word *Italus*, the firft fyllable whereof is naturally fhort.

DIASTYLE, from δια, and στυλος *a pillar*, in the *Ancient Architecture*, an edifice, where the columns ftand at fuch a diftance from one another, that three diameters, or fix modules, are allowed for the intercolumniation.

DIASURMUS, Διασυρμος from δια, and συρω, *I draw*, in *Rhetoric*, a figure whereby we fhortly anfwer, or rather evade, a thing which it would be tedious to reply to in form.

E. gr. "*What matters it to reply to an argument foreign to the purpofe?*"

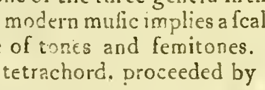
DIATESSARON, in the *Greek Mufic*, is the interval or concord of the 4th, which is the 3d confonance in perfection. (See Fourth.) The Greek word is compofed of δια τεσσαρων, as the interval confifts of 4 diatonic degrees.

DIATESSARONARE, a barbarous Latin word ufed by all muficians and other old writers on mufic, for difcant in 4ths.

DIATHESIS, in *Medicine*, fignifies any general condition of the habit of body: thus, phyficians fpeak of the phlogiftic or inflammatory diathefis, which confifts in a general fullnefs and ftrength of the body, and of the arterial fyftem in particular, which renders a perfon liable to inflammatory difeafes.

DIATONIC, *Adj.* The diatonic genus is the moft natural and fimple in mufic; it confifts of tones and major femitones, and in the fcale of which genus the fmalleft interval is a conjoint degree, which changes its name and place. The word comes from δια, *through*, and τονος, *tone*, that is, paffing from one tone to another: "God fave great George our King," and "Let ambition fire thy Mind," are almoft the only two Englifh airs that are ftrictly diatonic: *i. e.* totally without modulation by an accidental ♭ or ✻.

DIATONICO-GENERE, one of the three genera in the ancient Greek mufic, and which in modern mufic implies a fcale of founds, confifting of a mixture of tones and femitones.

The Greek diatonic genus, or tetrachord, proceeded by a femitone, and two tones, as B C D E ;

and it was from the fucceffion of two tones, that this genus acquired the name of diatonic. As the term is derived from δια, *by*, and τονος, *tone*; that is, paffing from one tone to another; which in the Greek mufic was never done but in the diatonic genus.

DIATONUM, Διατονον, is ufed for the diatonic genus. See Diatonic.

Diatonum, is a term ufed by M. Henfling for the femitone major $\frac{15}{16} = 57\,\Sigma + f + 5\,m$.

DIATRÆTA,

DIATRÆTA, a word ufed by Pliny, and other of the ancient Romans, to exprefs a fort of cups and vafes which were of great value, and only feen at the tables of the great. They were pellucid and colourlefs, and cut into various forms, and were often engraven upon with figures expreffive of the deeds of honour of the family who poffeffed them. The firft diatrætæ were made of pure cryftal of the rock, and the working of thefe rendered them very expenfive; but afterwards they were made of common white glafs, and funk greatly in their price and value. The ancients were very nice in their diftinctions of the feveral kinds of cryftal. They termed the pureft and fineft of all acentatum, and the others, which were fubject to blemifhes and foulneffes of feveral kinds, they called by names expreffive of them. There was nothing they fo much feared in the pieces they felected for this work, as what they called an over-hardnefs, that is, a brittlenefs, which made the veffel often fly under the engraver's tool, after it had been formed into fhape at a great expence: for this reafon they were cautious of ufing the very brighteft and cleareft maffes; for they often found thofe fucceed beft, which had fome of thofe flaws which we call hairs in them. Thefe they thought the tougheft pieces of cryftal, and thefe flaws they eafily concealed among the ftrokes of their work. See NUBES and SAL.

DIATRAGACANTH, in *Pharmacy*, an obfolete preparation with gum tragacanth and other emollients. It is now fuperfeded by the pulvis tragacanthæ compofitus.

DIATRIBE, from διατριβω, *I delay*, denotes a continued difcourfe.

DIATYPOSIS, Διατυπωσις, in *Rhetoric*, the lively defcription of a thing, fetting it, as it were, before the eyes of the audience. Thus Cicero, vii. in Ver. " Ipfe inflammatus fcelere, & furore, in forum venit; ardebant oculi; toto ex ore crudelitas eminebat, &c."

DIAUGOPHRAGMIA, in *Natural Hiftory*, a genus of feptariæ, whofe fepta are of fpar, with an admixture of cryftal, which being fometimes alfo mixed among the matterof the tali, renders the whole more bright and gloffy. See SEPTARIÆ.

Of this genus we have the following fpecies: 1. The ferrugineous red diaugophragmium, with brownifh yellow partitions. 2. The brownifh yellow diaugophragmium, with whitifh partitions. 3. The blueifh white diaugophragmium, with ftraw-coloured partitions. Vide Hill, Hift. Foff. p. 522.

DIAULION, from δια, and αυλος, a *flute*, in *Antiquity*, a defignation given to a performance on the ancient ftage with the flute alone.

DIAULODROMI, Διαυλοδρομοι, from διαυλος, and δρομος, thofe racers who turned round the meta, or goal, and finifhed their courfe at the career-barrier, or place of ftarting. The diaulodromi always took a fhort breathing or reft, when they arrived at the meta, before they fet out again for the career.

DIAULOS, from δις, *twice*, and αυλη, *ftation*, the name of a particular kind of foot-race, wherein the racers always returned to the place from whence they ftarted, and were called diaulodromi. This was added to the other games in the 14th olympiad.

DIAULOS is ufed to fignify a diftance of two ftadia, which was the length of the courfe in the race of this name.

DIAVOLO, in *Geography*, an ifland in the Grecian Archipelago. N. lat. 37° 17'. E. long. 23° 12'.

DIAZ, BARTHOLOMEW, in *Biography*, a diftinguifhed Portuguefe navigator, who claims a fhort notice as the difcoverer of the Cape of Good Hope. He was employed by king John II. of Portugal, in profecuting difcoveries on the coaft of Africa, and in 1486 he had traced nearly a thoufand miles of new country, and after encountering violent tempefts, and lofing the company of the victualling veffel which attended him, he came in fight of the Cape, that terminates Africa; but the ftate of his fhip, and the untoward difpofition of his crew, obliged him to return without going round it. He named it, on account of the troubles which he had undergone in the voyage, "Cabo Tormentofo," or the "Stormy Cape." He returned to Lifbon in December 1487, and from his report the fovereign forefaw that the courfe to the Indies was now certainly pointed out, and he denominated the newly-difcovered point "Cabo del Bueno Efperanza," or the "Cape of Good Hope." Robertfon's America.

DIAZEUTIC TONE, in *Mufic*, fignifies the interval of the major tone $\frac{8}{9} = 104\,\Sigma + 2f + 9m$.

DIAZEUXIS, a Greek mufical term, which implies divifion, feparation, disjunction.

The note which feparates two tetrachords was thus called in the ancient mufic, and which, added to either, formed a diapente. It is the tone major of the moderns in the ratio of eight to nine, and which is in effect the difference between the 4th and 5th of a key.

The diazeuxis, in the Greek mufic, was between the mefe, and paramefe: that is to fay, between the higheft note of the fecond tetrachord, and the loweft of the third; or between the note fynnemenon, and the paramefe hyperbolæon; or between the 3d and 4th tetrachord, according to the place where the disjunction happens; for it is impracticable at the fame time in both. The homologous ftrings of the two tetrachords, between which the diazeuxis lies, form a 5th; whereas, they form a 4th when conjoined.

DIAZIMUM, in *Ancient Geography*, a part of Cappadocia, in which was fituated the town of *Amafia*.

DIB, in *Ichthyology*, a variety of the SCIÆNA *Ramak*, which fee.

DIBBI, or DARK *Lake*, a lake of Africa, at the diftance of two days journey beyond the town of Jenne; in croffing which, from weft to eaft, the canoes are faid to lofe fight of land for an entire day. From this lake the river runs in feveral ftreams, forming two large branches, which join at Kabra, one day's journey fouth of Tombuctoo, and the port of that city or town.

DIBBLE, in *Agriculture*, the name of an implement or tool made ufe of for the purpofe of making holes in the ground for fetting grain, plants, and other forts of crops in, which are planted in rows. They are formed of different materials, and in different ways, according to the nature of the crop which is to be put in or planted out by them, but for grain they are moftly fhod with iron. In fome cafes they have likewife a fort of ftep for fetting the foot upon, in ufing them. When employed, they are thruft into the ground to a depth fuitable to the crop which is to be put in by them, and holes thus formed, into which the feeds, fets, or plants, are put by the hand.

DIBBLE, in *Gardening*, a fort of tool which is made ufe of for fetting and planting out different kinds of feeds, roots, plants, and cuttings. They are moftly made of the handles of old fpades, having the handle parts left entire, and the fhanks twelve or fifteen inches in length, gradually tapering to points at the lower ends; and to render them more complete, they are often fhod with a thin focket of iron, feven or eight inches in length, made tapering to the point. Dibbles thus fhod are found to make the holes more eafily, in a more clean manner, and with greater expedition, than thofe which are wholly of wood, which are apt to clog with the earth, and retard the bufinefs of planting.

Thefe tools, when intended for planting broad beans, potatoes, and large forts of roots, fhould be made with blunt points, as by being rounded at the ends the holes are fo formed as to admit them to the bottom; while the narrow pointed ones, by making the holes deeper than are necef-

fary,

fary, fo as to leave vacancies or openings below the feeds or roots, they are liable to permit water to ftagnate below them, and thus prove injurious, efpecially in the winter feafon. And befides, where the feeds or roots reft upon the bottoms of the holes, the growth of the plants is moftly more perfect and complete.

All the different kinds of bulbs, as thofe of the crocus, narciffus, tulip, &c. require this form of dibble in planting them out.

DIBBLER, in *Agriculture*, a perfon who is employed in the bufinefs of dibbling or fetting of crops by means of the dibble.

DIBBLING, the operation or procefs of fetting corn, feed, or other crops, by the dibble. It is chiefly practifed in the putting in of wheat crops, and thofe of the pulfe kind, in thofe diftricts in which labour is cheap. This practice was known at an early period, but was afterwards neglected, until the attention of the farmer was again drawn to it, by the writings of Mr. Varlo and fome others.

The author of Modern Agriculture remarks, "that the method of dibbling, or fetting wheat by the hand, was firft introduced into Norfolk about twenty years ago, by a perfon who poffeffed a fmall farm in the neighbourhood of Norwich; and that this practice, which gradually gained ground in that diftrict, has now become pretty general in the adjoining counties of Cambridge and Suffolk. In both of thefe, as well as in the county of Norfolk, confiderable quantities of wheat are annually fet by hand; but, in the laft, where the method was firft adopted, the quantity of wheat now planted by hand is not nearly fo confiderable as it was a few years ago. The wheat is generally dibbled in October, on land newly broken up from clover ley. When the foil is of a light nature, it is ufually rolled before the feed is planted; the method of which is as follows: a man with an iron dibble, about three feet long, in each hand, walking backward and making two rows of holes in each furrow, flice, or flag; they are made about four inches diftant from each other, and from one to two inches deep. The dibbler is followed by two or three women, boys, or girls, who drop two or three grains into each hole. The field is afterwards bufh-harrowed, by fitting thorns to a gate, and drawing it by one horfe along the furrows. The ufual quantity of feed is about fix or feven pecks, and the expence of fetting from nine to ten fhillings the acre. An experienced dibbler, with three active attendants, will plant half an acre a day, making fix holes in every foot length along the furrow-flice. The advocates for dibbling wheat ftate feveral advantages which, in their opinion, refult from adopting this method in preference of the ordinary one, fowing broad-caft. They fay a confiderable quantity of feed is faved, that the grain is better, more equal in quality, and the increafe greater; and further, that by the general eftablifhment of this practice the poor would find employment. There is no doubt but that a confiderable faving muft take place in the article of feed, when the grains are dropt at regular diftances, in place of being fcattered promifcuoufly. The quantity is faid to be, in general, about a bufhel the acre. Were no other benefit derived from adopting this practice than faving a bufhel of feed on the acre, that, at the ordinary price of wheat, is more than counterbalanced by the extra expence incurred. The farmer, in order to fave this bufhel of wheat, value five or fix fhillings, muft pay his labourers nine or ten. On this principle, therefore, the practice cannot be defended. It is natural to fuppofe, and will be readily admitted, that a crop of planted wheat will always be to a certain degree better, and more equal in quality, and (although from that circumftance probably, chiefly) greater in quantity, than that fown broad-caft. The crop, fpringing up at regular diftances, enjoys, during the whole period of its growth, a more free circulation of air, and derives greater benefit from the rays of the fun, than when, by fowing the feeds too thick or irregularly, the plants ftand fo clofe together that both are in a great meafure excluded. There is another reafon why the grain fhould be of a better quality. It was obferved, that wheat is commonly dibbled on land broken up from one year's clover. When wheat is fown broad-caft on fuch lands, a great many of the feeds fall naturally into the interftices of the furrows, where they are either choaked, or retarded in their growth, by the weeds, which fpring up there in greater abundance than in the other parts of the fields: whereas, when the feeds are fet in the flice or flags, the plants cannot meet with any impediment to retard their growth. Although, for thefe reafons it is highly probable that the produce of dibbled wheat muft always be fuperior in quality and quantity to that fown broad-caft; yet, without repeated experiments, or the eftablifhment of a law whereby all grain fhall be fold by weight, it is impoffible to determine the extent of that fuperiority, or whether fo much advantage refults therefrom as to encourage farmers in other parts of the kingdom, if practicable, to adopt the fame method. Some people have gone fo far as to affert, that dibbling wheat is one of the greateft improvements in modern agriculture; and that owing chiefly to the circumftances of its furnifhing work for the poor. In a populous diftrict, where agriculture is almoft the only employment of the inhabitants, and where the poor-rates have advanced to an extravagant height, the introduction of any practice whereby the poor can be ufefully employed, while the individuals who furnifh that employment, if they are not benefited, are not injured thereby, muft be deemed a very effential improvement. Dibbling wheat, therefore, in diftricts fo fituated, efpecially if followed out by hand-hoeing, fo as to afford ftill longer work, may be a very proper way of furnifhing employment for the peafantry. But the writer thinks, in a country like Great Britain, where the great body of the people are alternately employed in warfare, or in commerce and manufactures, and the ordinary operations of hufbandry, the impracticability of rendering this a general practice muft be at once obvious. The population muft, indeed, be amazingly increafed before that can happen. Populous as this ifland now is, beyond what it was at any former period, yet, were a law enacted, that all grain fhould be planted by hand, it would be neceffary that all ranks, the governors as well as the governed, fhould learn how to ufe the dibble. In a word, although the practice may be beneficial as well as laudable, in fome particular diftricts, no perfon in his fober fenfes will, he afferts, think of recommending the general eftablifhment of it, as an improvement in the national agriculture.

The author of the Report of Suffolk remarks, that "for wheat in fome diftricts a narrow-fet plough of only feven inches width at bottom, is ufed to plough with; a one horfe roll then follows to level the flag, or furrow, for the dibblers who ftrike only one row upon each: when the wheat is depofited, two or three kernels in each hole, a two horfe-roll follows, and afterwards the harrows twice in a place; when the field is finifhed in this manner, it is harrowed up again obliquely: by this method the wheat is depofited in the middle of the flag, at the diftance of nine inches in the row, and when come up, has the appearance of being drilled; the two-horfe roller is fuppofed of material ufe in clofing up the holes, and preventing the wheat from being difturbed by harrowing, and the land is made fo folid by rolling, that very little apprehenfions are entertained about the flug or worm. If there fhould be occafion to hoe in the fpring, the operation can be

be eafily and cheaply performed. Bufh-harrowing is fuppofed of very little ufe, as it can only fweep the duft or light mould over the holes, and in the firft fhower of rain that follows, moft of them will be feen, and much of the wheat be fwelled out of them. In the practice of dibbling peafe and beans as done in Gloucefterfhire and Middlefex, the method is chiefly this, the work being performed by women: as foon as the land can be got properly harrowed, and the furface fmoothed, in the fpring, that is, in the beginning and middle of February, the work of fetting commences; in fome places, in rows acrofs, but more frequently along the ridges. Some fetters ufe a line to direct them in forming the rows at equal diftances; others again, particularly thofe who have been long ufed to the bufinefs, do not confider the line as neceffary. The fetters begin each at the end of a row, and making holes at the diftance of about two inches from each other, and about the fame depth, depofit one pea or bean in every hole, and thus proceed, till the work be compleated. The diftance between the rows is feldom lefs than ten, and in few inftances, more than fourteen inches. The quantity of feed neceffary is from two and a half to three bufhels, according to the diftance of the rows; and the price of fetting, from *3s. 6d.* to *4s. 6d.* the acre. When the fetting of the field is completed, it is gently harrowed, in order to cover the feed, and the crop is repeatedly hand-hoed afterwards, as occafion requires. If," Mr. Donaldfon obferves, " the object which the Gloucefterfhire farmers have in view in adopting this practice, be to furnifh employment for the poor, the crops being always repeatedly hand-hoed by the perfons who were employed in putting the feed in the ground, is a ftrong additional circumftance in fupport of the juftnefs of the principles on which it was adopted, and of which thofe who are in the habit of fetting wheat cannot avail themfelves. If an extraordinary number of people be not employed, thefe repeated hoeings muft take up a confiderable period, and will not, in ordinary cafes, be finifhed before the commencement of the hay-harveft; which being again fucceeded by the corn-harveft, the induftrious poor are thus furnifhed with almoft uninterrupted employment in the fields for fix or feven months. In diftricts where the poor, from long habits of idlenefs, have become numerous, profligate, and ufelefs members of fociety, this muft be confidered in every point of view advantageous; while, under other circumftances, this method of managing bean-crops might be impracticable, from the rate of wages, and the people being fully employed in manufactures; or if practicable, neither beneficial to the community nor to individuals. Where thefe circumftances occur, and thus fortunately do fo over the greateft part of this ifland where improved agriculture is practifed, drilling beans, or dropping them in the bottom of every fecond or third furrow, and afterwards horfe-hoeing the crop, will be found a method not lefs favourable for the foil: and if at all, but in a fmall degree, lefs profitable to the farmer. It has been remarked, that it will obvioufly be neceffary with thefe crops, to have larger fpaces between the rows, and greater diftances in them, which muft render a larger portion of ground capable of being planted in a given time. When the children engaged in performing the work of dropping the feed into the holes, are only able to drop into one hole, fix are required to follow one dibbler; when capable of dropping into two holes, three are fufficient for one dibbler; and where they can drop into three holes, two are only requifite for a dibbler. The wages are various, according to thefe circumftances; for thofe who perform in the firft manner, it is generally three-pence a-day for each child; in the fecond, it is feven-pence; and in the third, about tenpence half-penny. Four men to perform the bufinefs of dibbling, with a fuitable number of droppers, are confidered as fufficient to work in one party, which is a much better practice than that of allowing the whole to work together, as the feed is fet with much greater regularity and exactnefs. The expence of performing the bufinefs is generally about nine or ten fhillings an acre for wheat, eight for barley and oats, and feven for peafe or vetches; but this muft evidently be liable to confiderable variation, according as the fituation is populous, and the price of labour is cheap, or the contrary. In fome of the dibbling diftricts, the difficulty and expence of the hand method have been attempted to be leffened by the ufe of machinery, fuch as rollers of the drill, and fpiked kind. The manual practice is, however, to be preferred, where labourers can be procured. This circumftance of ufing implements for the purpofe of putting in the corn, has probably led fome to fuppofe that the practice of dibbling was more on the decline, than is perhaps really the cafe.

It may be obferved that the kind of foils on which this method of putting in the feed has been practifed with the moft advantage, is the light and mixed fandy, and thofe of a loamy quality. On the deep ftiff clays, it is feldom had recourfe to. The newly broken up lands of almoft all defcriptions may in fome cafes be advantageoufly planted in this way. And various forts of crops have been found capable, in particular fituations and circumftances, of being put into the ground in this way with advantage, fuch as thofe of wheat, barley, oats, peafe, beans, and vetches: the firft is, however, the kind of crop for which it is moft commonly employed. Oats may in many cafes be beneficially dibbled on fuch lands as have been newly ploughed up from leys. But it is fuppofed by the author of the Suffolk Report, that barley can feldom be dibbled, by reafon the land is fo dry in April, that the holes will run in, and not ftand open to receive the feed.

In the more fouthern parts of the kingdom, the moft favourable feafon for putting in wheat in this mode has been found to be the latter end of September, or the beginning of October; the months of March and April for barley and oat-crops, and for peafe and beans as early in the fpring months as the nature of the feafon will admit of its being done.

With regard to the quantity of feed that is required in this method of putting it into the ground, it is confiderably lefs than where the broad caft, or perhaps even the drill-fyftem is followed; but the favings muft conftantly depend in a great degree upon the fteadinefs and accuracy of the perfons employed in dropping the feed, and the number of the feeds that are put into each hole. It has been fuggefted by an experienced cultivator in this way, that where the droppers are properly attended to, the faving in wheat may be about fix pecks in the acre, in barley eight, and in peafe and vetches about four.

It is ftated that the number of grains that are depofited in each hole is different, in different circumftances, but the moft general practice, and that which has been found the moft fuccefsful, is, three or four for grain-crops, and one or two for thofe of peafe, beans, and others of the fame kind. It is evident, however, it is fuppofed, that they fhould neither be fet too thickly, nor in too thin a manner; as in the former cafe, the plants may be drawn up, and the crops, in confequence, become weak and unproductive: and in the latter, as where only one grain is placed in each hole, they may be fo thin as to afford but a fcanty produce from the want of plants. Where due care has been taken in the putting in of the feed, there is moftly a confiderable increafe of produce in this way of fowing over the others.

The exact amount of the additional produce that is thus obtained,

obtained, has not, however, been fully ſhewn by the experiments of intelligent cultivators ; but it has been ſuppoſed in reſpect to wheat, to be from four to ſix buſhels in the acre, in the Report of Agriculture for Norfolk, and the reſult of an experiment, made with the view of aſcertaining the difference in the produce between ſowing and ſetting barley, proves it to be ſtill greater in that ſort of grain, the experimenter having had twelve buſhels on the acre more in the land that was dibbled, than that which was ſown. Concluſions drawn from looſe eſtimates, or ſingle experiments, ſays the author, cannot, however, be depended upon ; but it can ſcarcely be doubted, that the quantity of produce is greater in the method of dibbling the ſeeds, than ſowing it broadcaſt. In the quality of the grain, there is likewiſe a ſuperiority : the wheat and barley produced in this way are ſaid to be not only more free from droſs, but larger in the kernel, and conſequently weighing conſiderably heavier. It is eaſy to perceive, that when the ſeed is put into the ſoil in the regular and equal manner that is the caſe in ſetting with the hand when well performed, the crops, of whatever kind they may be, may have a ſuperiority in theſe different reſpects, both from the plants, in ſuch inſtances, being leſs crowded together, and their becoming, in conſequence, more ſtrong and vigorous, and from the air and ſun being more fully admitted, by which they become more equally, as well as more perfectly, ripened. It is probable too, that in ſuch caſes, from the greater regularity of the plants, the hoeing or after-culture of the crops, where it is practiſed, may be more effectually, and more fully performed. There is alſo another reaſon, that, in particular inſtances, has been ſuggeſted as the cauſe of the quality of the grain in this mode of ſowing being ſuperior ; which is that of wheat being frequently dibbled upon ſuch land as has been broken up from a new clover-ley, in which caſe, the ſeeds being ſet in the furrow ſlice, or flag, the plants are not liable to be obſtructed in their growth : whereas, when ſown in the uſual broad-caſt method, much of the ſeed muſt of courſe fall into crevices and openings between the furrow-ſlices, where they muſt be greatly impeded in their vegetation by weeds and other cauſes. This ſhews likewiſe the abſurdity of putting wheat crops in by the broad-caſt method upon ſuch preparations of the land."

In the Norfolk Report on the ſtate of agriculture, ſeveral minutes on this practice are introduced by Mr. Young, by which it would ſeem that there are two methods of performing the buſineſs ; thoſe of putting one, and two rows on each flag or furrow-ſlice. About Brandon and Old Buckingham, &c. in that diſtrict one row on an eight inch flag, or even a narrower one, is preferred. At Oxborough, and its vicinity, they put in, of wheat, in this way, ſix pecks to the acre. This they find better than two rows ; and to be much ſuperior to drilling. The crops are afterwards well hoed, and generally prove very beneficial. It is ſuggeſted by ſome farmers that this practice ſhould only be had recourſe to while the ſeaſon ſuits, either for wheat or oats, both of which are there dibbled, as when the land is wet and cold, the water is apt to lodge in the holes, and deſtroy the vegetative power of the ſeed.

In many other places in the county, two rows on the flag, often as near as they can be put, are, however, held in preference. In this manner, from ſix to ſeven pecks, but in ſome caſes, nine are put in, to the acre. The work is ſuppoſed by ſome to be beſt performed by women with a proper perſon to ſuperintend them, as they are more obedient and manageable. The expence is uſually from nine ſhillings to ten ſhillings and ſixpence the acre.

It is ſuppoſed by Mr. Everit, that one buſhel of ſeed would be ſufficient. He made an experiment in the view of forming a compariſon of the beſt manner of executing the buſineſs. The uſual mode is, to ſpread the two rows on the flag in ſuch a manner, that they are liable to be too near the ſeams ; but he directed the dibblers to keep their hands as cloſe together as they could work them, ſetting the two rows very near each other in the centre of the flag. And the reſult, he ſays, proved the excellence of the practice, the crop having a very beautiful appearance. Mr. Crow is, however, inclined to ſuppoſe a good proportion of ſeed neceſſary, as he has never ſeen a good crop of wheat that was thin ; beſides its being more liable to the attacks of the mildew.

The whole of the obſervations would appear to ſhew, that the practice is not to be purſued merely as ſaving ſeed, as was at firſt ſuggeſted ; but from the buſineſs being performed in a more advantageous way than by other methods. It is, indeed, remarked by Mr. Johnſon, that it is a practice of ſuch excellence, "that equal crops are not to be gained in any other way ;" but that "three grains ſhould always be put in every hole ; for, on various examinations, he has found, that a ſingle kernel in a hole, has almoſt always produced a faint ear, ſcarcely ever a good one."

It is probable, from what has already been remarked upon this ſubject, that a ſingle row on a flag may be the moſt proper where hand-weeding is afterwards practiſed ; but that where this is neceſſary, two rows on the flag may be a more advantageous method, and that more than one grain ſhould, in general, be put in each hole.

The advantages which have, on the whole, been chiefly looked to in this mode of putting in crops, are thoſe of ſaving ſeed ; having the lands, where inclined to be light, ſufficiently trodden ; the keeping of the crop clean, rendered leſs difficult ; and the employing of a number of women and children, who would otherwiſe be out of work. Beſides, it is ſuppoſed that the crops are not ſo liable to lodge in bad ſeaſons, from their having better hold of the ground, and the ſtraw being more ſtiff, and in reaping the grain being leſs apt to ſhed or drop out of the ear. See DRILL and DRILL-*huſbandry*.

DIBE, or PESCHIERA, in *Geography*, a town of Egypt, on the coaſt of the Mediterranean : 18 miles S.E. of Damietta.

DIBI, a town of Egypt, on the W. ſide of the Nile ; 8 miles S.E. of Roſetta.

DIBLATHA, or DIBLATHAIM, in *Ancient Geography*, a town beyond Jordan, at the foot of mount Nebo or Piſgah. Jer. xlviii. 22.

DIBOMA, a town of Macedonia, in the country of the Eordites. Ptolemy.

DIBON, a town of Judea, in the tribe of Gad, given to this tribe by Moſes, and afterwards ſurrendered to Reuben. (Numb. xxii. 3. 33, 34.) Euſebius ſays, that it was a large town on the river Arnon. It was probably the ſame with Dibon-Gad, an encampment of the Hebrews. (Numb. xxxiii. 45.)—Alſo, a town in Judah, the ſame, perhaps, as Debir, or Kirjath-Sepher. Nehem. xi. 25.

DIBRA, in *Geography*, a town of European Turkey, in Macedonia, on the confines of Albania. It was beſieged by the Turks in the year 1442, who, by conveying a dead dog into the only ſpring which ſupplied the town with water, obliged the inhabitants to ſurrender : 30 miles N. of Ackrida.

DIBS, a name given at Aleppo to the inſpiſſated juice of the grape, which has much the appearance, ſays Ruſſel, (vol. i. p. 82.) of coarſe honey, but is of a finer conſiſtence. It is much uſed by the inhabitants of Aleppo ; is brought to

to town in large goat-fkins, and retailed in fmall quantities in the bazars. This is fuppofed by Dr. Geddes to be the honey, דבש, mentioned Gen. xliii. 11. Neither common honey nor palm-honey, he fays, (Crit. Rem. p. 135.) could have been confidered as a rare gift to a governor of Egypt, where palms and bees were fo abundant; whereas raifin-honey, or a fyrup made out of the grapes, which did not grow in Egypt, might be deemed even a royal prefent.

DICA, in *Law*, a tally for accounts, by the number of tallies, cuts, or notches.

DICACITAS, in *Oratory*, the name given by Cicero (De Oratore, l. ii. c. 54.) to that kind of wit which ufually lies in a fingle fentance or word, and which may be termed "concife wit or jefting." The other kind he calls *cavillatio*, which is confined within no certain limits, and which, in our language, may be called "continued wit or humour."

DICÆA, in *Ancient Geography*, a town of Thrace, in the territory of the Biftonians, and near the Biftonide Marfh. It was alfo named *Dicæopolis*.—Alfo, a town of Greece, on the Thermaic gulf.—Alfo, an epifcopal town of Africa, in Bizacium.

DICÆARCHA, a place in Italy, fo called by the Greeks, and named by the Latins *Puteoli*, which fee.

DICDICA, a town of Africa Propria, according to the Itinerary of Antonine.

DICE, among *Gamefters*, certain cubical pieces of bone or ivory, marked with dots on each of their faces, from one to fix, according to the number of their fides.

Sharpers have feveral ways of falfifying dice: 1. by fticking a hog's briftle into them, fo as to make them run high or low as they pleafe; 2. by drilling and loading them with quickfilver; which trick is difcovered by holding them gently between two diagonal corners; when, if falfe, the heavy fide will turn always downwards; 3. by filing them. But all thefe methods fall far fhort of the arts of the dice-makers, fome of whom are fo dextrous, that fharping gamefters will give any money for fuch dice. Dice are faid to have been invented by Palamedes at the fiege of Troy, for the amufement of the officers and foldiers.

Dice pay a large ftamp-duty, and are prohibited to be imported.

DICE *Marle*, in *Hufbandry*. See MARLE.

DICEARCHUS, in *Biography*, a follower of Ariftotle, was a native of Meffenias, and acquired diftinction by his philofophical difputations, and hiftorical writings. Cicero (Tufc. Quæft. l. i. c. 10.) fpeaks of him as a learned and eloquent writer. His tenets were that there is no fuch thing as mind, or foul, either in man or beaft; that the principle, by which animals perceive and act, is equally diffufed through the body, is infeparable from it, and expires with it; that the human race always exifted; that it is impoffible to foretel future events; and that the knowledge of them would be an infelicity. He was an eminent geographer, and took great pains, to meafure the height of mountains, and to conftruct accurate maps of countries. Plin. l. ii. c. 65. Fabr. Bib. Græc. v. ii. p. 295.

DICERA, in *Botany*, (from δις and κερας, alluding to the two horns of the anthers,) a genus of Forfter's, referred by Linnæus the younger to *Elæocarpus*. See ELÆOCARPUS *Dicera*.

DICERATION, in the *Writers of Medicine*, a name given to a collyrium mentioned by Celfus, and thus named from κερας, a *horn*, burnt hartfhorn being a principle ingredient in it.

DICHONDRA, in *Botany*, (from δις, and χονδρος, *a grain*, on account of the form of the capfule, refembling two grains or berries.) Forft. Gen. Pl. 20. t. 20. Schreb. 176. Swartz. Prod. 54. Willd. Sp. Pl. v. 1. 1353. Juff. 129. Clafs and Order, *Pentandria Digynia*. Nat. Ord. *Convolvuli*, to which it is now removed by Juffieu himfelf from his *Borragineæ*, where he had firft placed it.

Gen. Ch. *Cal.* Perianth inferior, in five deep, regular, obovate, many-ribbed, fomewhat fpreading fegments. *Cor.* of one petal, wheel-fhaped, regular, in five deep lanceolate fegments, as long as the calyx; with a very fhort tube. *Stam.* Filaments five, awl-fhaped, equal, fhorter than the corolla, and inferted into its tube; anthers ovate, blunt, of two lobes. *Pift.* Germen fuperior, double, hairy; ftyles two, as long as the ftamens, awl-fhaped, divaricated, originating, according to Forfter, from the inner fide of each germen at the bafe; ftigmas capitate. *Peric.* Capfules two, accompanied by the permanent enlarged calyx, each nearly globofe, of one cell. *Seeds* folitary, globofe.

Eff. Ch. Calyx in five deep fegments. Corolla inferior, wheel fhaped, in five deep fegments. Capfules two. Seeds folitary. D. *repens* of Forfter, Smith Plant. Ic. t. 8. (Sibthorpia evolvulacea; Linn. Supp. 228.) is efteemed by Dr. Smith the only fpecies. It was fent by Mutis to Linnæus from New Granada, and was found by Commerfon at Buenos Ayres, and the ifland of Mauritius. It is alfo known to grow in Jamaica, Peru, and New Zealand. The ftems are proftrate, creeping, flender, branched, round, and leafy. Leaves alternate, on long filky ftalks, upright, kidney-fhaped, more or lefs emarginate, entire; fmooth, or flightly hairy above; more or lefs filky beneath, and marked with radiating ribs. Flower-ftalks axillary, moftly folitary, fimple, filky, fhorter than the leaves. Flowers very fmall, a little drooping, white. Calyx externally hairy, internally fmooth. Fruit much larger than the flowers. When very filky and filvery in the afpect of its leaves, it is the D. *fericea* of Swartz., Willd. Sp. Pl. v. 1. 1353; but there feems to be no permanent fpecific diftinction. Poffibly, if the fuppofed varieties were compared in a living ftate, fome certain marks of difcrimination might be obferved, but no botanift has yet had fuch an opportunity. The Jamaica variety only has hitherto been brought into the more curious gardens of Europe. According to Mr. Donn, it was introduced here in 1786, and is perennial, flowering in the ftove in July.

DICHORÆUS, in *Poetry*, the foot of a Latin verfe confifting of four fyllables; of which the firft is long, the next fhort, the third long, and the laft fhort. It is a double *choræus*, as *cōmprŏbārĕ*.

DICHOTOMOUS, in *Botany*, is applied to a ftem regularly and repeatedly cloven, or forked; more efpecially if, as ufually happens, a folitary flower fprings from each fork or divarication. Inftances are found in the genus *Ceraftium*, and many of its allies, and in *Chlora perfoliata*, Engl. Bot. t. 60. Some leaves are formed in a dichotomous manner, as thofe of *Ceratophyllum*, and of a fpecies of Sun-dew from New Holland, thence denominated *Drofera dichotoma*.

DICHOTOMY, *bifection*, a term ufed by aftronomers for that phafis, or appearance of the moon, wherein fhe is bifected, or fhews juft half her difk, or circle; or when fhe is in the beginning of her firft and laft quarter.

The word is Greek, formed of διχοτομεω, *I bifect*, or *cut into two*; of δις, *twice*, and τεμνω, *I cut*.

The time of the moon's dichotomy is of confiderable ufe in fixing the fun's diftance from the earth: and it was anciently applied by Ariftarchus for this purpofe. In order to underftand his method of doing this, we have only to confider that the phafes of the moon are produced by the different pofitions of its illuminated hemifphere with regard to

to an obferver on the earth. Confequently, when one of thefe pofitions is fuch that the plane of the circle which feparates the enlightened from the dark part, paffes through the eye of the fpectator, then the confines of the light and fhade on its diameter will form a right line: at this time we may fuppofe three right lines, *viz.* one drawn from the eye of the fpectator at T, *(Plate* IX. *Aftronomy, fig.* 67.*)* to the centre of the moon, L, another from this centre to that of the fun S, and a third from the centre of the fun to the obferver's eye, at T, to form a triangle T L S, having a right angle at the centre of the moon, a very acute angle at the fun, and the third approaching to a right angle at T. Ariftarchus propofed to obferve the inftant that the moon appears dichotomized, and at the fame inftant to obferve the magnitude of the arc intercepted between the fun and moon, whence he obtained the angle L T S, and thus he found the proportion of the fides of the triangle, one of which is the diftance of the moon from the earth, and another that of the fun; fo that he hence obtained the proportion of one of thefe diftances to the other. Ariftarchus found that this angle was not lefs than 87°, and hence concluded that the diftance of the fun from the earth was from 18 to 20 times that of the diftance of the moon from the earth. He found alfo, by a procefs of reafoning, that the diameter of the moon was to that of the earth in proportion greater than that of 43 to 108, and lefs than that of 19 to 60; or fomewhat lefs than a third of that of the earth. See ARISTARCHUS.

But it is very difficult to fix the precife moment when the moon is bifected, or in her true dichotomy. Obfervation informs us, that when fhe is thirty minutes diftant from the quadratures, fhe appears bifected; but fhe appears fo too in the quadratures themfelves, and fome time afterwards, as Ricciolus acknowledges in his Almageft. So that fhe appears dichotomized at leaft for the fpace of a whole hour: in which time any moment may be taken for the true point of the dichotomy, as well as any other. But the infinite number of moments of time give an infinite diverfity of diftances. The moment in which the true dichotomy happens being thus uncertain; but it being granted withal, that it happens before the quadrature; Ricciolus takes the middle point between the quadrature, and the time when it is firft dubious, whether the moon be dichotomized, or not, for the true dichotomy. Keil.

DICHOTOMY, in *Botany*, a term ufed to exprefs that divifion of the branches, which we fee in mifletoe, and in the greater part of the fea-fucufes, in which each branch is divided into two. See DICHOTOMOUS.

DICHOTOPHYLLUM, the name by which Dillenius, and feveral others, call the hydroceratophyllum of Vaillant, and fome other writers; a genus of plants charactered by Linnæus in his Genera Plantarum under the name of ceratophyllum.

DICHROMENA, (from δι or δις, and χρωμα, *colour*, alluding to the variegation of white and green in its involucrum.) Michaux Fl. Boreal-Amer. v. i. 37. Vahl. Enum. v. 2. 240. Clafs and order, *Triandria Monogynia*. Nat. Ord. *Cyperoideæ*.

Gen. Ch. *Spikelet*, compofed of ovato-lanceolate concave glumes, imbricated in all directions, and feparating the florets. *Cor.* none. *Stam.* Filaments 3, very rarely 1 only, elongated after flowering; anthers linear. *Pift.* Germen minute; ftyle capillary, elongated; dilated and compreffed at the bafe; ftigmas 2, capillary, the length of the ftyle. *Peric.* none. *Seed* folitary, fomewhat lenticular, tranfverfely rugged and undulated, crowned with an obtufe beak originating from the permanent bottom of the ftyle; and deftitute of briftles at its own bafe. *Vahl.*

Eff. Ch. Glumes imbricated every way. Corolla none. Stigmas 2. Seed fomewhat lenticular, tranfverfely rugged and undulated, crowned with a blunt point, and without briftles at the bafe.

This genus, founded by Michaux and adopted by Vahl, confifts of five known fpecies, one of which is *Schoenus ftellatus* of Swartz and Lamarck, and another. *Scirpus reptans* of Richard. *Actes de la Soc. d'hift. nat. de Paris*, v. i. 106. Their common habit is thus defcribed by Vahl.—"They have the afpect of *Kyllingiæ*. The culms are feveral, without joints, triangular in the upper part, ftriated, clothed at the lower part with the fheaths of the leaves, which are numerous, undivided, and very minutely ftriated, like the leaves themfelves, which are linear. Involucrum widely fpreading, compofed of feveral leaflets, refembling the proper leaves, one of which only is fhorter than the head of flowers, the others gradually longer. Spikelets feffile, forming a head, oblong. Glumes membranous, whitifh, pellucid, fomewhat keeled, acute." The fpecies are all natives of South America, Carolina, or the Weft Indies.

DICK, in *Agriculture*, a term provincially employed to fignify the mound or back of a ditch. See FENCE.

DICK-*Hole*, a word fignifying the hollow excavation or ditch itfelf. See FENCE.

DICK, in *Geography*, a town of America, in the ftate of South Carolina; 16 miles W. of Queenborough.

DICK'S *river*, a river of America, in Kentucky, which is a branch of Kentucky river, joining it in a N. W. direction. It is about 50 miles long, and 45 yards wide at the mouth. It has upon it a number of excellent mill-feats, and runs through a tract of valuable land.

DICKER, or DICRE, *Dicra* in our *Old Writers*, a quantity of leather confifting of ten hides.

Some derive the word from the Greek δεκα, ten.

We find the word dicra applied to other things befides leather; thus, "Civitas Glouceftriæ reddebat xxxvi. dicras ferri;" which is interpreted thirty-fix dickers of iron, ten bars to the dicre. Gales's Hift. Brit. 766. ap. Blount.

DICKINSON, or DICKENSON, EDMUND, in *Biography*, a celebrated Englifh phyfician and chemift, in the 17th century, was born at Appleton, in the county of Berks, in the year 1624. From Eton fchool he was removed in 1642, to Merton college, Oxford. After taking his degree in arts, he was entered in the medical line in 1649, and admitted to the degrees of bachelor and doctor in phyfic, in the year 1656. In 1655, he publifhed a work, entitled "Delphi Phœnicizantes," &c. defigned to prove that the Greeks borrowed the ftory of the Pythian Apollo, and whatever rendered the oracle of Delphi famous, from the Holy Scriptures, and, particularly, from the book of Jofhua. This work, which difplayed fingular fkill in the Oriental and Greek languages, and a profound knowledge of antiquity, procured for the author a high degree of reputation, both at home and abroad, and, induced Dr. Shelden, afterwards archbifhop of Canterbury, to perfuade him to take orders, and to devote his talents to the fervice of religion. But he declined a change of his profeffion. Anthony Wood has fuggefted, that the real author of the above mentioned work was Henry Jacob, a prodigy of learning, but a carelefs man, who fuffered others to obtain that fame, which belonged to him, by furrendering to their ufe his laborious productions. But though the evidence adduced by Wood is ftrong, it is not fufficient to determine a point, which muft impeach the character of Dr. Dickenfon, and evince him to be altogether deftitute of integrity. He, however, had the reputation of being the author, and derived benefit from the opinion that was entertained, in confequence of it, of his learning,

ing. The warden and fellows of Merton college, in recompence of his literary merit, conferred on him the place of fuperior reader of Linacre's lectures, which he enjoyed for fome years. After this he applied to chemiftry, and quitted the college life in order to practife as a phyfician. In the year 1684, on the death of Dr. Willis, he removed to London, took his houfe and exercifed his profeffion with great reputation for many years. Having been fuccefsful in treating the defperate cafe of the earl of Arlington, lord chamberlain to king Charles II. he was introduced by that nobleman to his majefty, and appointed one of his phyficians in ordinary, and phyfician to the houfhold. By his knowledge of chemiftry, he became a great favourite at court, and his majefty honoured him frequently with his company in the royal laboratory. He continued in favour during the remainder of the reign of Charles II. and of his brother, who fucceeded him. At Oxford he had become acquainted with a French adept in alchemy, named Theodore Mundanus, who feems to have made a convert of him to the doctrine of the tranfmutation of metals. His conviction of the truth of this doctrine was announced to the world in a work publifhed in 1686, entitled "Epiftola Edmundi Dickinfon, M.D. and M.A. ad Theod. Mund. Philofophum adeptum de Quinteffentia Philofophorum, &c." 8vo. Soon after the abdication of King James II. Dr. Dickinfon retired from practice, on account of his advanced age and growing infirmities; but he ftill profecuted his literary and fcientific labours, and in 1702 publifhed a work, entitled "Phyfica Vetus et Vera, five Tractatus de Naturali Veritate Hexaemetri Mofaici, &c." 4to. The object of this publication is to prove, "that the method and mode of the creation of the univerfe, according to the principles of true philofophy, are ftrictly and concifely laid down by Mofes." From the nature and profeffed object of this work, we fhould imagine that the author was the precurfor of the Hutchinfonians, of whom we fhall give fome account in a proper place. Dr. Dickinfon publifhed fome other works, which, after the preceding fpecimen of his labours, we need not mention. He died in the year 1707. Biog. Brit. Wood's Athen. Oxon. vol. ii. Gen. Biog.

Dickinson, in *Geography*, a townfhip of America, in the ftate of Pennfylvania, and county of Cumberland; containing 1845 inhabitants.

DICKSCOVE, a name given by the Englifh to Infiamma, a village of Africa, on the Gold Coaft, fituated on a fmall creek, which admits only boats. The fort at this place was rebuilt by the Englifh in 1691, who forced the Pruffians to evacuate it. The fituation of this fort is faid to be inconvenient for trade, and it is placed in the midft of a fraudulent, intractable, and obftinately vicious band of negroes, with whom there is no dealing in fafety. It borders on the fea, is of a quadrangular form, built of ftone and cement, and its principal ftrength confifts in 4 baftions, mounted with twenty cannon, and it has gardens equally pleafant and ufeful.

DICKSON, a town of America, in North Carolina; 40 miles N.E of Fayetteville.

DICKSONIA, in *Botany*, (fo named by the late Mr. L'heritier, in juft commemoration of Mr. James Dickfon, F.L.S., whofe diftinguifhed merits refpecting the clafs *Cryptogamia* render this fine genus of ferns peculiarly fuitable for the purpofe.) Ait. Hort. Kew. v. 3. 469. Smith Act. Taurin. v. 5. 416. t. 9. f. 7. Tracts 250. t. 1. f. 7. Swartz Fil. 136. Mart. Mill. Dict. Clafs and order, *Cryptogamia Filices*. Nat. Ord. *Filices*.

Eff. Ch. Fructification in roundifh, marginal, diftinct, prominent fpots. Involucrum double; one from the furface, feparating outwards; the other from the inflexed margin of the frond, feparating inwards.

Dr. Swartz enumerates and defines 16 fpecies of Dickfonia, but as he has not feen fpecimens or even figures of them all, many are involved in great obfcurity. The following are the principal with which we are acquainted.

D. *arborefcens*. Ait. Hort. Kew. v. 3. 469. L'herit. Sert. Angl. tab. unpublifhed. (D. integra; Sw. Fil. 136.) Arborefcent. Fronds twice pinnate; their ftalks and ribs downy: leaflets oblong, obtufe, convex, pinnatifid. Fructification at the fummit of each lobe, globofe. Native of the ifland of St. Helena, from whence Miller received it many years fince. We have feen it in the ftoves at Kew, where it formed a fingularly rich and tufted bufh, about 4 feet high, with a rough and fhaggy ftem 5 or 6 inches in diameter. Each feparate branch or frond is 2 or 3 feet long, fpreading, rather drooping, doubly and alternately pinnate, with hairy or downy ftalks. Leaflets oblong, obtufe, very convex; fmooth and ftrongly veined above; paler, with downy ribs, beneath: the lower and larger ones deeply pinnatifid, and fomewhat ftalked; the upper lefs deeply cut into roundifh marginal lobes, feffile and decurrent. Fructifications globofe, or (when clofed) flightly compreffed, folitary at the extremity of each lobe. Involucrum of two brown, hemifpherical or kidney-fhaped, concave, equal valves, enfolding a globofe hairy receptacle covered with annulated fhining capfules. We fee no reafon for changing the original name of this fpecies, even though there are other arboreous ones, becaufe fuch changes are endlefs, and efpecially becaufe the term *integra* does not appear, in any fenfe, fuitable. D. *fquarrofa*. Sw. Fil. 136. (Trichomanes fquarrofum; Forft. Prod. 86.) "Arboreous. Fronds imperfectly bipinnate: their firft divifions oblong, pointed: leaflets confluent at the bafe, lanceolate, fharply ferrated: ftalks rough with hairs." *Sw.* Found in the South-fea iflands. In this, according to Forfter, the fructification is fituated in the finufes of the leaflets. We have feen no fpecimen. D. *Culcita*. Ait. Hort. Kew. v. 3. 469. Fronds repeatedly compounded, pointed, fmooth: leaflets elliptic-oblong, flightly concave, decurrent, obtufely pinnatifid and crenate. Fructification at the fummit of each lobe, compreffed. Difcovered by the late Mr. Francis Maffon in the iflands of Madeira and the Azores. It has been in the Green-houfe at Kew ever fince the year 1786. This is an herbaceous fern, but large and fpreading. Frond with a fmooth ftalk, its branches four times alternately pinnate, the principal ones taper-pointed, leaflets decurrent, elliptical or oblong, obtufe, more or lefs deeply pinnatifid and crenate, all rather concave than convex, efpecially when dried. Fructifications folitary in the marginal lobes of the upper parts of the frond, kidney-fhaped, compreffed. The roots are crowned with denfe tufts of foft filky fhining brown hairs, like the Barometz or Scythian lamb, which is alfo a fern. D. *cicutaria*, Swartz Fil. 137. Fl. Ind. Occ. 1695. (Polypodium bacciferum; Lam. Encycl. v. 5. 554: Lonchitis altiffima globuligera minor; Plum. Fil. t. 31. Adiantum nigrum ramofum maximum, foliis feu pinnulis obtufis, variè fed pulcherrimè finuatis et dentatis; Sloane Jam. v. 1. 96. t. 57. f. 1. 2.) Fronds repeatedly compound, with roughifh ftalks: leaflets oblong, deeply pinnatifid, ferrated at the top. Fructification in the finufes, globofe. Obferved on the fides of mountains in Jamaica by fir Hans Sloane and Dr. Wm. Wright. The fronds are three feet high, or more, of a pleafant green, finely fub-divided, with roughifh red-brown ftalks. Leaflets thin, flat, oblong inclining to wedge-fhaped; their tips blunt and notched; their fides pinnatifid. Fructifications greenifh, globofe, each placed in a finus of the leaflets. Veins nearly ftraight. D. *altiffima.*

ma. (Polypodium globuliferum ; Lamarck Encycl. v. 5. 554 ; Filix altiffima et globuligera major ; Plum. Fil. t. 30.) Fronds twice or thrice pinnate, pointed ; leaflets elliptic-oblong, decurrent, obtufe, pinnatifid, crenate. Fructification in the finufes, globofe. Veins wavy. Gathered by Thierry in St. Domingo. A very handfome fpecies, whofe ftalks are roughifh. Pinnæ taper-pointed with a regularly winged ftalk ; pinnulæ or leaflets alternate, decurrent, three quarters of an inch long and about half as much in breadth, oblong, fomewhat elliptical, obtufe, fharply crenate at the top, deeply pinnatifid, furnifhed with zig-zag hairy ribs and veins. Fructifications pale, globofe, each folitary in the finufes of the leaflets. Inner involucrum membranous and almoft white. This feems undetermined by Dr. Swartz, unlefs it be his *apiifolia*, which we have not feen. The fynonym of Plumier, unqueftionably belonging to our plant, he places among the doubtful fpecies, accidentally writing *minor* for *major*. D. *forbifolia*. Fronds bipinnate : leaflets feffile, linear-lanceolate, acutely ferrulated, tranfverfely veiny. Fructifications numerous, globofe. Inner involucrum very fhort. Gathered in the ifland of Honimoa in the Eaft Indies, in July 1797, by the late Mr. Chriftopher Smith, to whom the author of the prefent article is indebted for moft numerous and valuable additions to his herbarium. The prefent fern feems entirely non defcript. It appears to be four or five feet high, of a fomewhat glaucous green. Frond alternately bipinnate ; its ftalks pale and fmoothifh beneath, fingularly hairy above. Pinnæ long and taper-pointed, each compofed of 60 or more leaflets, which are about an inch long, perfectly feffile but not decurrent, linear-lanceolate, acute, finely and fharply ferrated, fmoothifh above, minutely punctate beneath, and furnifhed with a hairy rib and numerous parallel veins. Fructifications numerous, in a tolerably regular marginal feries, fmall ; their outer involucrum green, cup-fhaped, crenate, rugofe when dry, clofely inflexed ; the inner fo fhort as to be not difcernible till the ball of capfules is removed. D. *glauca*. Fronds bipinnate : leaflets feffile, crowded, oblong, falcate, crenate, glaucous beneath. Fructifications numerous, globofe. Involucrums equal, entire. Of the height of this fern we know nothing, being poffeffed of only a portion of the middle part of its frond, brought by Mr. Menzies from the Sandwich iflands. The pinnæ are numerous, crowded, a fpan long, fmooth, linear-lanceolate, compofed of very numerous, crowded, feffile, linear-oblong, falcate, convex, obtufe, crenate leaflets, which are veiny, and very glaucous beneath, each being half an inch, or rather more, in length. The veins are branched and fmooth. Fructifications in an uninterrupted feries on the lower part of each leaflet, at each margin, pale brown when ripe. Outer involucrum truly originating from the margin of the leaflet, though different in texture and colour, concave, kidney-fhaped, fmooth and quite entire, embracing the inner involucrum, which is exactly like it, only fomewhat longer and narrower. We have thought it more ufeful to defcribe thefe three new fpecies than to copy the definitions of the remaining 10 in Swartz, among which are *Polypodium nudum* and *Trichomanes flaccidum* of Forfter, *Cœnopteris japonica* of Wildenow ; *Polypodium marginale* and *Trichomanes ftrigofum* of Thunberg, Fl. Jap. with *Davallia linearis* of Cavanilles, and *repens* and *abrupta* of M. Bory de St. Vincent ; the three laft equally unknown to Dr. Swartz and to ourfelves, except from defcriptions. S.

DICKVEL, in *Geography*, a town of the ifland of Ceylon, near the South coaft ; 102 miles S. of Candy.

DICKWASSET, or DIGDEGUASH, a river of America, in the province of New Brunfwick, which difcharges itfelf into Paffamaquoddy bay.

DICLINIA, in *Botany*, (from δις, *double*, and κλινη, *a bed*,) is ufed by Linnæus in his *Syftema Vegetabilium*, p. 21, for fuch claffes or genera of plants as have feparated flowers, the ftamens being in one bloffom, the piftils in another. This feparation is either complete, as in the claffes *Monoecia* and *Dioecia* ; or incomplete, as in *Polygamia* ; fome flowers of the latter clafs having the ftamens and piftils together, while in others they are feparate. The writer of the prefent article has firft fuggefted, that fuch feparation of the effential organs of impregnation in flowers, is of material importance or convenience, either in natural, or even artificial, claffification, only when it is accompanied by a concomitant difference in the other parts of the flower, as in the Oak, Walnut, Hazelnut, &c. In thefe and fimilar inftances the two organs are not liable to meet in the fame flower. By attention to this circumftance, the Linnæan clafs *Polygamia*, the burthen and opprobrium of the fexual fyftem, on account of the uncertainties and difficulties which attend its determination, among the trees of tropical climates more efpecially, will be brought into very narrow limits. If the fame rule be extended to the claffes *Monoecia* and *Dioecia*, they will alfo be delivered from numerous genera and fpecies, whofe allies or whofe congeners are in other parts of the fyftem. Hence the whole arrangement will become more natural, as well as more eafy and certain, and the three claffes in queftion will be fo much diminifhed, that it may be expedient to unite them into one, under the title of *Diclinia*. See Itroduction to Botany, 395, 470, 485, &c. S.

DICOCCUS, FRUCTUS, a two grained fruit or feed-veffel, technically applied to that particular kind of capfule which has the appearance of being compofed of two roundifh combined capfules, as in the genus *Dichondra*, fo named from that very circumftance. A three-grained, or tricoccous, capfule is much more frequent; and a whole natural order of plants, to which the *Euphorbia* belongs, derives its character and name from having fuch a fruit. See TRICOCCÆ.

DICOTYLEDONES, (from δις, *double*, and κοτυληδων, a *cotyledon* ; which laft word is technically applied to the feminal leaf of a plant, apparently becaufe its roundifh form and flefhy texture refembles the herb *Cotyledon* or Navelwort,) is a term ufed for all fuch plants as have two cotyledons or feed-lobes. See COTYLEDON. This vaft and difcordant tribe makes up the chief part of a natural fyftem of arrangement, though indeed the families which have only one cotyledon, or, more properly, for the moft part, none at all, are likewife confiderable in number and importance, as the natural orders of Palms, Lilies, Orchifes, Graffes with their allies, and perhaps all the Linnæan clafs *Cryptogamia*, Moffes excepted. The latter have numerous and compound cotyledons, though otherwife clofely related to plants that have none. So alfo the Fir tribe, *Pinus*, &c. have numerous cotyledons, though in every other point agreeing with genuine *dicotyledones*. No natural fyftem of botanical arrangement can therefore in future fet out, as they have all hitherto done, with making the diftinction abfolute between *Acotyledones*, *Monocotyledones*, and *Dicotyledones* ; ftill lefs can the *Polycotyledones* form a feparate affociation together ; indeed this laft has never been attempted.

The two-feed-lobes of the *Dicotyledones*, like the numerous ones of firs and moffes, ufually rife out of the ground as foon as the root has fixed itfelf in the earth, witnefs the Lupines; but fome other plants, even of the fame natural order, as many Vetches, never raife their cotyledons above the furface. Thofe cotyledons which appear above-ground affume the colour and functions of leaves, of which the Radifh, Parfley, and French-bean are inftances; while others remain but little altered

altered in the earth till they decay, as may be feen in the Horfe-chefnut and Garden Nafturtium or *Tropæolum*. Whatever difficulties may exift in a claffification founded on the organs in queftion, the diftinction between plants furnifhed with two cotyledons and thofe that have only one or none, is, to all intents and purpofes of arrangement or phyfiology, more abfolute and decifive than any other general character hitherto detected. S.

DICRANUM, (δίκρανον, a *fork*, from δὶς, *double*, and κέρας, *a horn*, *fummit*, or *point*, expreffive of the two fharp points into which each tooth of the fringe furrounding the mouth of the capfule is cloven.) Fork-mofs. Hedw. Fund. v. 2. 91. t. 8. f. 41, 42. Schreb. 759. Sm. Fl. Brit. 1201. Swartz. Mufc. Suec. 31. (Fiffidens; Hedw. Fund. v. 2. 91. Bryi Mnii et Hypni fpecies variæ, Linn.) Clafs and order, *Cryptogamia Mufci*. Nat. Ord. *Mufci*.

Eff. Ch. Capfule oblong. Fringe of fixteen flat cloven teeth, a little inflexed.

The Hedwigian fyftem of moffes, by taking into confideration the ftructure of their fringe or *periftomium*, has very happily feparated from thofe which have a double fringe, fuch as have only a fimple one, and is in no refpect more happy than in the eftablifhment of genera on the number and ftructure of the teeth which compofe that fimple fringe. Among the reft *Dicranum* is diftinguifhed from all the reft by its teeth being all cloven about half way down, regularly and uniformly for the moft part; for there are fcarcely two or three fpecies in which fome of the teeth are found unequally three-cleft. Such exceptions by no means invalidate the generic character. By this mark are brought together from the *Bryum* and *Mnium* of Linnæus principally, and more fparingly from his *Hypnum*, a great number of moffes, much more naturally allied to each other than to any with which they had previoufly been afforted, and now conftituting by themfelves, and their recently difcovered allies, fo vaft a genus, that the moft able cryptogamic botanift muft ftand appalled at the number and intricacy of its fpecies. Of thefe about 100 may be collected from various authors, but poor muft be the herbarium which cannot fupply feveral that are nondefcript. We fhall not bewilder the reader in this labyrinth, from which without the help of elaborate and numerous figures we could not extricate him. We fhall attempt only a view of the leading features of this genus, and of its principal fpecies.

The ufual habit of a *Dicranum* is marked by crowded flender or awl fhaped, moftly fingle-ribbed and entire, leaves, thofe fpecies which compofe the genus *Fiffidens* of Hedwig chiefly having two-ranked compreffed and dilated foliage. In thefe the female flower is often lateral, but in the bulk of the genus terminal, the fruit-ftalk becoming lateral in confequence only of the fubfequent extenfion of the ftem beyond it. The capfule is often fmooth, in fome inftances deeply furrowed longitudinally. Lid various in length. Teeth ftrong, frequently very red, ftrongly furrowed tranfverfely, their tips flender and pale. The male flowers in the *Dicranum* of Hedwig are, according to him, on a diftinct plant from the female, in the form of little round terminal heads; in his *Fiffidens* they are axillary on the fame plant with the capfules, and refemble buds. The habits of thefe two genera are fo different, that in this cafe, if in any, the Hedwigian principle, of taking the male flowers into confideration for the generic characters of moffes, might be admitted; but the difficulty of examining thofe parts in all the fpecies of fo vaft a genus, at that early period of growth when alone they are to be met with, is infurmountable, nor can Hedwig be fuppofed to have feen them in a fifth part of his fpecies, any more than Fabricius could examine the organs of the mouth in a fiftieth part of his infects. Both of them muft, after all, have frequently trufted to habit, general configuration, or to the more obvious Linnæan principles.

The 1ft fection of *Dicranum* in the *Species Mufcorum* of Hedwig, has the capfule without any *apophyfis* or pedeftal, the fruit-ftalks ftraight, and the leaves curved to one fide. Of this the chief are D. *fcoparium*, Engl. Bot. t. 354, common on heaths and in woods; the more rare D. *majus*, t. 1409, found on rocks by the fea near Bangor; the common but elegant little D. *heteromallum*, t. 1272, which makes a green velvet carpet on the fhady paths of woods on a gravelly or fandy foil.

The 2d fection has leaves lefs accurately inclining to one fide, in which we find D. *crifpum*, Engl. Bot. t. 1151; D. *varium*, t. 1215, and *rufefcens*, t. 1216. The latter feems not to be known out of Britain. D. *aciculare* alfo ranges here, whofe leaves are broader and more obtufe than in moft of the genus.

The 3d fection has leaves fpreading every way, and not curled by drying; their tips without hairs. To this belongs D. *purpureum*, abundant on walls and gravelly hills, (where its innumerable crimfon ftalks are confpicuous in the fpring:) as well as feveral other European or American fpecies partly akin to it.

The 4th has fpreading leaves with hair-like points, as D. *latifolium*, Hedw. Crypt. t. 33, a native of North America, given by Mr. Dickfon to the younger Linnæus, and by him to Hedwig, who celebrates the gift and the donor in high terms.

Section 5th has fpreading leaves, becoming curled or crifped when dry. The chief of thefe is the large and rare D. *fpurium*, found, but without fruit, by the late Mr. Teefdale, an able cryptogamift, on turfy moors in Yorkfhire. It is figured in Hedw. Crypt. v. 2. t. 30, and was thus named on account of its male flowers being thofe of a *Fiffidens*, gemmiform, though the habit is that of a true *Dicranum*. The teeth of the fringe are fome of them occafionally three-cleft. D. *polycarpum*, another *Fiffidens* of Hedwig, Crypt. v. 2. t. 31. likewife ranges here.

In fection 6th the fruit-ftalks are incurved, the capfule, as before, without an apophyfis. Among which are D. *flexuofum*, Engl. Bot. t. 1491, (Bryum flexuofum of Linnæus,) frequent in alpine ftations; the elegant Weft-Indian *D. cygneum*, Hedw. Sp. t. 37, and *introflexum*, t. 29.

Section 7th has an *apophyfis* or gland-like bafis to the capfule, as D. *cerviculatum*, Engl. Bot. t. 1661, found on turfy heaths in England, Germany, and Switzerland, a very elegant little mofs; D. *Celfii*, Hedw. Sp. t. 33, (Bryum Celfii of Linnæus,) found in Sweden, and very rarely in Scotland.

Thefe fections not being altogether natural, nor always eafy to define, they have not been attended to in the Flora Britannica, but the fpecies have been attempted to be difpofed more naturally, not however with perfect accuracy, for fuch muft be the fruit of time and repeated enquiries.

The 8th fection of this genus, the Fern Fork-Moffes, may be defined, as in Fl. Brit., with compreffed leaves, fpreading in two ranks; and thefe form a very natural and beautiful family. The chief are; D. *viridulum*, Engl. Bot. t. 1368, the fo much difputed *Bryum viridulum* of Linnæus, one of the fmalleft of moffes; D. *bryoides*, t. 625, which fome able botanifts ftill confound with D. *ofmundioides*, t. 1662; D. *taxifolium*, t. 426, which is not uncommon in moift fhady places, old gardens, &c.; and the larger more con-

conspicuous D. *adiantoides*, t. 264, found in watery boggy ground.

From this genus the learned Mr. Turner has removed D. *sciuroides* of Fl. Brit. to *Pterogonium*, on account of its lateral fruit-stalks and their scaly sheaths; and he is followed in Engl. Bot. t. 1903. D. *pulvinatum* of Swartz and Fl. Brit. is also removed to *Grimmia* in Engl. Bot. t. 1728; and D. *viridissimum* proves to be a *Gymnostomum*; see Engl. Bot. t. 1583. It is proper also to mention that D. *callistomum*, Fl. Brit. and of Dickson, is found not to differ from *rigidulum*, Engl. Bot. t. 1439; while the Anglesea plant of the Rev. H. Davies, from which the full description was made, is D. *varium*.

To compensate in part for these defalcations, we have to announce, that D. *longifolium*, Hedw. Crypt. v. 3. t. 9, is found in Scotland by Mr. George Don; a species of which we had no certain intelligence, as British, when the 3d vol. of Fl. Brit. was published. S.

DICRICH. See DIECKIRCH.

DICROTUS, in *Natural History*, a word used by the ancients to express the deer or stag when in its third year's growth. It was called nebus by the ancient Greeks in the first year, puttolea in the second, dicrota in the third, and in the fourth, and all its life afterwards, ceraftes.

DICROTUS, from δις, *twice*, and κρεω, *I strike*, in the *Medicinal Writings of the Ancients*, the epithet given to a peculiar sort of pulse, which Dr. Nihill calls very properly in English the rebounding pulse. In this kind of pulse the artery beats as it were double; and is esteemed a certain sign of a future critical hæmorrhage by the nose. See PULSE.

DICTAMNUS, in *Botany*, (so called by Linnæus after the δικταμον or δικταμνος of Theophrastus and Dioscorides, which is most assuredly a different plant; neither does his derivation of the name in the Philosophia Botanica, from τικτειν, to bring forth, confirm the propriety of his application of it. However suitable that explanation might be to the real Dittany of Crete, *Origanum Dictamnus*, and the history of its expelling arrows from the wounded goats, it has no reference to our plant. Hence Tournefort, and of late Gærtner, have called the latter *Fraxinella*, a word intolerable, as a generic name, to Linnæan scholars. Some have taken the plant in question for the τραγιον of Dioscorides, but with no great appearance of probability; nor has Dr. Sibthorp, though he gathered it in Greece, left us any information concerning its Greek name, antient or modern.) Fraxinella, or Bastard Dittany. Linn. Gen. 209. Schreb. 287. Willd. Sp. Pl. v. 2. 541. Juss. 297. (Fraxinella; Gærtn. t. 69.) Class and Order, *Decandria Monogynia*. Nat. Ord. *Multisiliquæ*, Linn. *Rutaceæ*, Juss.

Gen. Ch. *Cal.* Perianth of five small oblong pointed leaves, deciduous. *Cor.* Petals 5, ovato-lanceolate, pointed, furnished with claws, unequal; two of them twisted upwards; two standing obliquely at the sides; and one bent downwards: all dotted with resinous points. *Stam.* Filaments 10, unequal, awl-shaped, about as long as the petals, and bent downwards below, the two lateral ones, sprinkled with resinous glands; anthers square, ascending, simple. *Pist.* Germen superior, slightly stalked, with five angles, depressed at the top; style short, declining, recurved; stigma acute, ascending. *Peric.* Capsules five, connected by their inner margin, compressed, pointed, radiating, each of two valves. *Seeds*, two in each cell when ripe, ovate, polished, lodged in a common, bivalve, elastic, notched arillus.

Ess. Ch. Calyx of five leaves. Petals five, unequal, spreading. Filaments besprinkled with resinous glands. Anthers terminal, simple. Capsules five, conjoined.

The only species is D. *albus*. Linn. Sp. Pl. 548. Willd. Sp. Pl. v. 2, 541. Jacq. Austr. t. 428. Bauh. Pin. 222. (Fraxinella; Ger. em. 1245.) A native of shady somewhat mountainous places in Germany, France, Switzerland, Italy, and Greece, commonly cultivated in the open borders of our gardens without any particular care, flowering in June and July. The roots are perennial. Stems annual, a foot or two high, simple, leafy in their middle part, each terminating in a large upright rigid panicle of very handsome rose-coloured flowers, occasionally white. The leaves are pinnate, somewhat resembling those of the ash, whence the name *Fraxinella*. The specific name *albus* alludes to the whiteness of the root. The whole plant abounds with a strong aromatic essential oil, smelling like lemon peel, with a resinous flavour, to many persons very agreeable. In hot dry weather, a highly inflammable vapour is emitted by the flowers or their viscid stalks, which explodes on the approach of a flame. S.

DICTAMNUS *capensis*. See CALODENDRUM.

DICTAMNUS *creticus*. See ORIGANUM.

DICTAMNUS *falsus*, or *Pseudodictamnus*. See MARRUBIUM.

DICTAMNUS, in *Gardening*, comprizes a plant of the herbaceous, hardy, perennial, flowering kind; the Fraxinella, or White Dittany, (D. *albus*). It rises from one to two feet in height, with several stems, and the whole plant, when gently rubbed, emits an odour similar to that afforded by lemon-peel, but when bruised, has something of a balsamic smell.

It has varieties with white flowers, with red and purple striped flowers, and with short spikes of flowers.

Method of Culture.—These plants may be increased by sowing the seeds in the beds, borders, or other parts of pleasure-grounds or gardens, where they are to remain, in the beginning of the Autumn, soon after they become ripe, or in the Spring; but the former is the best season, as the plants rise stronger, and with more certainty. The plants should afterwards be kept perfectly clean from weeds, and have their stems cut down and cleared away every year in the Autumn, as well as the earth dug round them in the early Spring. Some, however, advise the roots of the plants, in the first Autumn, to be taken up and planted out in small beds, at six or eight inches distance each way, to stand two or three years, till they are strong enough to flower, when they are to be carefully taken up in the Autumn, and placed where they are to remain. They continue for a great length of time, and require little culture, except that of being kept free from weeds, and trimmed as above in the Autumnal season.

They are plants which are well suited to the middle parts of beds, borders, clumps, and other compartments of ornamented grounds.

DICTATE, DICTAMEN, in the *Schools*, a suggestion, motion, or sentiment of a man's conscience. A good action becomes evil, if done contrary to the dictates of one's own conscience.

DICTATE, *Dictata*, is likewise used in the *Schools* for a lesson, or exercise, wherein the master reading, or speaking something, the scholars take it down in writing after him. Here the act of the master is likewise called dictating.

DICTATOR, a Roman magistrate, created by the senate, or people, on some extraordinary and eminent occasion, to command, with sovereign authority, for a certain time, ordinarily limited to six months, though the office was sometimes continued to twelve.

The nomination of this magistrate appears to have been assigned by law to either of the two consuls; but the choice

was confined to ſome one of thoſe ſenators who had before obtained the conſulſhip; and the uſual method was for the ſenate to decree, upon any great exigency, that a dictator ſhould be made, and to direct on what perſon of conſular dignity the nomination ſhould fall. Yet it was in the power of either of the conſuls, without any order from *them*, and without the approbation of his colleague, to name, of his own accord, any conſular ſenator to this ſupreme magiſtracy; and their approbation, concurring with ſuch an appointment, fully ratified and confirmed it, however diſagreeable it might be to the people. A remarkable inſtance of this, and likewiſe of the uſe occaſionally made of the dictatorial power for the purpoſes of the ſenate, occurs in the account which is given by Livy (l. iv. c. 13, 14, 15.) of the events of the year 316 from the building of Rome. When the conſuls refuſed to nominate a dictator, the ſenate called upon the tribunes of the people, to compel them, by their power, to name one. An inſtance to this purpoſe occurs in the year of Rome 324. In the year of Rome 542, the ſenate decreed, that the conſul, before he went out of the city, ſhould aſk the people when they would be pleaſed to have him name a dictator, and ſhould name the perſon they ordered; and this ſeems to be the only inſtance in the Roman hiſtory of the ſenators ſubmitting to the will of the people the nomination of the perſon who ſhould be raiſed to this office. The firſt dictator, choſen from among the people, was C. Marcus Rutilius, an. U. C. 399. B. C. 355. He nominated C. Plautius, general of the horſe, who was alſo a plebeian. This nomination very much afflicted the ſenate, who did their utmoſt to thwart the expedition of a plebeian dictator. He ſet out from Rome, marched againſt the enemy, defeated them on ſeveral occaſions, killed a conſiderable number of them, and took 8000 priſoners. On his return to Rome, he triumphed by a decree of the people, in which the authority of the ſenate had no part.

Recourſe was never had to ſuch an officer but in dangerous and difficult times; as ſudden wars, popular factions, &c. He had abſolute and monarchic power while his dictature laſted: and ſome will even have it, his power went beyond that of the kings. However, he was not allowed to march out of Italy, leſt he ſhould take advantage of the diſtance of the place, to attempt ſomething againſt the common liberty. He was always to march on foot, except in caſe of a ſudden or tedious expedition: and then he formally aſked leave of the people to ride. In all other things his power was abſolute and uncontrolled. He might proclaim war, levy forces, lead them out, diſband them, &c. without conſulting the ſenate. He could puniſh as he pleaſed; and from his judgment there was no appeal.

Some learned writers have maintained, that the law propoſed by the conſuls, Horatius and Valerius, in the year of Rome 306, eſtabliſhed a right of appealing to the people againſt the acts or decrees of a dictator. But if this had been true, it would have been the groſſeſt abſurdity for Livy (l. iv. c. 13.) to make Titus Quintius, no more than 10 years afterwards, (ann. U. C. 316) give it as a reaſon for naming a dictator, that the conſuls, "being ſubject to the laws of appeal," had not ſtrength in their magiſtracy ſufficient for the exigency of the ſtate at that time. A magiſtrate, "equally ſubject to the laws of appeal," could not have ſupplied the defect of power in them. But the hiſtorian ſays expreſsly, that the dictator was free from that reſtraint, "liber exſolutuſque legum vinculis." Indeed it appears that the law of Horatius and Valerius had no reference to the dictatorial office, the object of it being to prevent the introduction of any new-invented magiſtracy, ſuch as the decemvirate had been, without the controul of an appeal to the people. (See Liv. l. iii. c. 55. l. ii. c. 18.) From this laſt cited paſſage it appears, that a dictator was inveſted with a power without appeal, either to any other magiſtrate, or to the people; a power, againſt the terror of which the people had no help, but unreſiſting obedience.

In order to render his authority more awful, he had always 24 faſces with axes carried before him; whereas the conſuls had only 12. The authority of all other magiſtrates ceaſed, or they were ſubordinate to him, except only that of the tribunes of the people, who exerciſed the functions of their office, independently of him. The conſuls were only his lieutenants, and appeared in his preſence as private perſons. When he was in the city, he preſided in the ſenate, and cauſed its reſolutions to be put in execution. The general of the horſe, which was the ſecond dignity in the Roman ſtate, was appointed by him, but did not ſhare in authority with him; he was only a principal officer, that received the dictator's orders, and ſupplied his place in his abſence; his office, like the dictatorſhip, was temporary. When his authority, as dictator, expired, he was not obliged to give an account of any thing he had done during his adminiſtration. The origin of this office was unknown even in Livy's time: though ſome ancient authors ſpeak of T. Lartius Flavus as the firſt dictator, who was appointed in the year of Rome 256, B.C. 498. "Sed nec anno, nec quibus conſulibus—nec quis primum dictator creatus ſit, ſatis conſtat: apud veterrimos tamen auctores, T. Lartium dictatorem primum, Sp. Caſſium magiſtrum equitum creatos invenio. Conſulares legere." Liv. lib. ii.

The idea of this office ſeems to have been taken from Alba, of which city the Romans were a colony, and may therefore have adopted, without much deliberation, what had been practiſed there; but the occaſion of their having recourſe to it, was (according to Livy) the inſtant dread of a war, which 30 Latin cities, confederated with the Sabines, threatened to make againſt Rome. In theſe circumſtances, the ſenate reſolved to introduce a magiſtrate, whoſe power ſhould be monarchical, and ſuperior to all laws, but of ſhort duration. For this purpoſe, they paſſed an artful decree, by which they deceived the people, and without their perceiving it, aboliſhed the law in favour of their liberty. It was conceived in theſe terms: "that Lartius and Clœlius, who were then conſuls, ſhould abdicate their power, and by their example all perſons whatſoever in the adminiſtration of the public affairs. That there ſhould be but one magiſtrate; that he ſhould be choſen by the ſenate, and confirmed by the voices of the people, and that his power ſhould not exceed the term of ſix months. The people acquieſced. All the qualities requiſite in this new officer were thought to unite in T. Lartius; nor was his colleague deſtitute of merit. The ſenate, therefore, decreed, that one of the two conſuls ſhould nominate the new magiſtrate, which was always obſerved for the future; and, in conſequence of a ſecond deliberation, that in the preſent conjuncture he ſhould nominate his colleague. The two conſuls contended with each other, neither of them allowing that he deſerved the preference to his colleague. Thus they paſſed the whole day in mutually giving each other their voices for the office, whilſt neither would accept it. The aſſembly being diſmiſſed, the relations and friends of the two conſuls, and the principal ſenators, repaired to the houſe of Lartius, where they remained till night, conjuring him not to oppoſe the wiſhes of the public. Overcome by their earneſt remonſtrances, he at length conſented that his colleague ſhould nominate him dictator; for thus that ſupreme magiſtrate was called, or at leaſt that name was the moſt celebrated, and the moſt uſed. The true name appears to have been "Magiſter populi."

From

From the circumstance above mentioned, the custom was probably derived of declaring the dictator in the night, which is often mentioned by Livy (lib. iv. c. 21. lib. viii. c. 23. lib. ix. c. 38.)

The constitution of the Roman republic is praised by Polybius (l. vi.) as a happy mixture of monarchy, aristocracy, and democracy; but the dictatorship reduced it under a kind of domination more properly tyrannical than regal. In Rome, a single consul, agreeing with the senate to name a dictator, without the concurrence, and against the will of the people, might subject, at any time, the liberty and the life of every Roman citizen, to the arbitrary power of one man, set above all the laws, and in no way responsible for the exercise of his sovereignty, to the justice of the state. Indeed, after the end of the second Punic war, the senate itself became so jealous of the danger of this office, that, for 120 years before Sylla took it, no dictator was appointed. The manner in which he chose to have it conferred on him was as follows: both the consuls of the year of Rome 670, B. C. 84, having perished in the war which Sylla and his friends made against them, he notified to the senate, that agreeably to the custom of their ancestors, in such cases, they should create an *interrex* to hold the *comitia* for electing new consuls. They named to that office the president of the senate, Lucius Valerius Flaccus; to whom Sylla wrote, and bade him report his opinion to the people, that the present state of affairs required the appointment of a dictator; not for the term of six months, but till the whole commonwealth, and every part of the empire, which the civil wars had shaken, should be more firmly settled, and brought into better order; adding, at the end of his letter, that, if the senate approved it, he offered himself to do the republic this service. His offer was understood to be a command; he therefore was named dictator by the *interrex*, without any term being fixed for the expiration of his office; and thus, says Appian (De Bell. Civ. l. i.) "the dictatorship, which had before been a tyranny limited to a short time, this restraint being taken off, the tyranny became compleat." The dictator was not content with this indefinite prolongation of his power; but caused a law to be proposed by the *interrex* to the people, which "ratified all his acts, whatever they might be, and authorised him to put to death, without a trial, any citizen of Rome, according to his pleasure." Cicero calls this "the most unjust, and the most unlike a law, that had ever been made," and he considers it "as null and void in itself." Yet to such an extreme degree of servility were the people and the senate reduced, that it was enacted without the least opposition; and Sylla rewarded Flaccus for having been the propounder of it, by naming him to the dignity of his general of the horse. Cæsar was the next perpetual dictator to Sylla. After Cæsar there were no more dictators; for Antony, in the year of Rome 710, B. C. 44. abolished this office; and in doing it, he reserved the honour of this action entirely to himself. For he did not propose the affair, according to usual custom, to the deliberation of the senate, but he brought the decree with him ready drawn up. On which the title and office of dictator were for ever abolished, with imprecations against any one who should attempt to revive them, and a power for any citizen to attack and kill him with impunity. This, as may be evidently perceived, was indirectly casting a slur on Cæsar's memory, and not only establishing and confirming the present liberty, but securing it against any future attempts.

After the famous battle of Thrasymenus, an. U. C. 537, B. C. 217, which was the third defeat of the Romans, in less than a year after Hannibal had entered Italy, the Romans were in great consternation, and entertained apprehensions for the city itself. But because the consul to whom alone it appertained to nominate a dictator, was absent, and it was not easy to carry any message to him, as the Carthaginians occupied all the passes, Q. Fabius Maximus was elected *Prodictator*. He was allowed to be the only person whose greatness of soul, and gravity of manners, corresponded to the dignity and majesty of that office; and the more, as he was still of an age, in which the mind is of sufficient vigour to execute the designs it has formed, and in which resolution and boldness are tempered with prudence. Fabius demanded permission of the people to ride in the army; which, by an ancient law, the dictator was expresly forbidden to do.

Dionysius Halicarnasseus derives the word dictator *ab edicendo*, because they ordained or appointed what they pleased. But Varro will have the word taken hence, that the consul named him, which the Latins call dicere, lib. iv. De Lingua Latina. "Dictator quod a consule dicebatur, cujus dicta audientes omnes essent."

DICTE, in *Ancient Geography*, a mountain of the island of Crete, now called *Sethia*, and also *Lasthi*, next in height to mount Ida, and covered for a great part of the year with snow; whence it is denominated by Strabo, Pliny, and Ptolemy, the white mountain. However, cypress-trees grew there anciently amidst the snow, and throve as well as in the vallies. This mountain obtained its name from Dictynna, a nymph of Crete, who is supposed first to have invented hunting-nets, and to have been called Dictynna on that account; having before been named Brito-martis. This mountain was consecrated to Jupiter; and hence he obtained the appellation of DICTÆUS, as well as from a cave of this name in the island in which he had been concealed.

DICTIDIUM, a town of Greece, situated near mount Athos.

DICTION, the phrase, elocution, or style of a writer or speaker.

The diction or language of an orator should be pure, proper to the subject, rich without affectation, strong and close without dryness, and suitable to the person, time, place, and audience. See ELOCUTION, and STYLE.

The diction of a drama is accounted the fourth of the essential parts thereof, the other three being the fable, the manners, and the sentiment; it is of the least importance of any; yet must peculiar care be taken herein to make every passion speak its proper language. See DRAMA.

DICTIONARY, a collection, or catalogue of all the words of a language, or art, with their significations, ranged in order of the alphabet.

What the Latins, and we after them, call dictionary, the Greeks call Lexicon.

For the proper character, nature, office, &c. of a dictionary, see the preface to this work. See also VOCABULARY.

The most ancient dictionaries for the Latin tongue, are, that called Papias, compiled by Solomon, abbot of St. Gall, bishop of Constance, who lived about the year 1409; another made in 1469, called Gemma Vocabulorum; a third in 1502, called Gemma Gemmarum: and a fourth by Dionysius Nestor, a Cordelier.

The most celebrated old Latin dictionary is that of Ambrose Calepine, a hermit of St. Augustine at Bergamo, and son of the count of Calepine. Conrad Gesner is said to have augmented this with four thousand words. Paulus Manutius increased it still more; and Passerat after him; and yet Matthias Martinius made two volumes of their omissions.

There is another noted Latin dictionary of Crispinus: to say nothing of Cowper, Holyoake, Gouldman, Littleton, Cole, Ainsworth, and many others of less consideration.

For the Greek, we have those of Henry Stevens and Scapula,

Scapula, Schrevelius, and Hedericus; for the Spanifh, thofe of Covarruvias, and Delpino: for the Italian, thofe of the Academy della Crufca, Veneroni, and Baretti: for the French, thofe of Nicod, Fa. Monet, Fa. Gandin, Furetiere, Richelet, Trevoux, that of the French Academy, Boyer, and Chambaud: for the Englifh, we had fcarce any worth the mentioning (unlefs, perhaps thofe of Lloyd, Philips, Kerfey, and Bailey) before the publication of the complete and accurate one by Johnfon: and yet this admits of improvement. Junius has a dictionary, or alphabet, of the Gothic, Runic, and Anglo-Saxon. There is another in the Malayan, which is a dead language, famous throughout the Eaft Indies, where it ftands inftead of the Latin among us.

There are alfo hiftorical and geographical dictionaries: as that of Charles Stephens, which is tranflated into French, and augmented by Moreri: another of Hofmann, printed at Bafil in 1677, in two volumes folio; which are followed by a continuation of as many volumes, in 1683: another by Mr. Bayle, under the title of Hiftorical and Critical Dictionary, firft printed at Rotterdam in 1697, in two large volumes, now making five in Englifh: a Philofophical dictionary, by Mr. Chauvin of Berlin; befides feveral law dictionaries, as Jacob's; phyfical dictionaries, as James's; family dictionaries; dictionaries of arts, as the Encyclopedia, &c. of commerce, as Savary's by Poftlethwaite, &c.

The firft Mufical Expofitor, or dictionary, containing definitions of mufical terms that we have been able to find, is that of John Tinctor, entitled, Terminorum Mufice Difinitorium, printed at Naples, 1474. This was doubtlefs not only the firft mufical dictionary that was ever compiled, but the firft book that was printed on the fubject of mufic in general. The work is fo fcarce, that we have never been able to find it, except in his majefty's ineftimable library, abounding with the moft fcarce, valuable, and beautiful copies of the moft precious productions of the prefs: all written mufic of the 15th century, in counterpoint, being compofed for voices; at leaft we have feen no other, and being intended for the church, it was fet to Latin words, fo that the firft terms in the art were likewife in that language, and thefe were fo numerous in 1474, that the author collected them into a book, and with his definitions dedicated them to the princefs Beatrice of Arragon, daughter of Ferdinand, king of Sicily, Jerufalem, and Hungary. It is a curious circumftance, that the word temperament does not occur in this primitive lexicon, though major and minor tones, and femitones are defined, which are the offspring of temperament.

The triple progreffion of Pythagoras, by which the fcale is formed by a feries of perfect fifths, has no diftinctions of major and minor tones, and femi-tones. See DIDYMUS, PTOLEMY, TINCTOR, and DIATONIC.

DICTI, in *Ancient Geography*, a ftation of Great Britain, in the Notitia Imperii, pertaining to the Nervii Dictenfes, which, by the general confent of antiquaries, is fuppofed to have been fituated at Amblefide in Weftmoreland, where the ruins of a Roman ftation are ftill vifible.

DICTIS, a town of Afia, in Galatia, in the country of the Tectofages.

DICTORES, in our *Old Writers*, is ufed for an arbitrator.

DICTUM, is ufed for an arbitrament or award.

DICTUM *de Kenelworth*, an edict or award between king Henry III. and thofe barons who had been in arms againft him. It was fo called becaufe made at Kenelworth caftle in Warwickfhire, anno 51 Hen. III. It contained a compofition of five years rent for the lands of thofe who had forfeited them in that rebellion.

DICTYMNIA, or DICTYNNIA, in *Mythology*, were feafts celebrated at Lacedæmon and in Crete, in honour of Diana Dictymnia, or Dictynna, or of a nymph taken for her, who, having plunged herfelf into the fea, to efcape the paffion of Minos, was caught in a fifherman's net, or δικτυον, whence the name. See DICTE.

DICTYNNÆUS MONS, in *Ancient Geography*, called alfo *Dictamnum Promontorium*, and *Dicte Mons*, a promontory on the northern coaft of the ifle of Crete, towards the north-weft. This promontory was at the extremity of a mountain, on which was a temple of Diana, hence called *Dictynna*. This mountain was called *Dicte*, as well as another which was fituated towards the eaft.

DIDACTIC, in the *Schools*, fignifies the manner of fpeaking, or writing, adapted to teach or explain the nature of things.

The word is formed from the Greek διδασκω, *doceo*, *I teach*.

There are many words that are only ufed in the didactic, and dogmatic way: and there are many works, ancient and modern, both in profe and verfe, written after this method.

Didactic poetry, as diftinguifhed from other fpecies of poetry, which are intended by indirect methods, as by fable, narration, and reprefentation of characters, to make ufeful impreffions on the mind, openly profeffes its intention of conveying knowledge and inftruction. It differs, therefore, in the form only, not in the fcope and fubftance, from a philofophical, a moral, or a critical treatife in profe; but at the fame time, by means of its form, it has feveral advantages over profe inftruction. By the charm of verfification and numbers, it renders inftruction more agreeable; by the defcriptions, epifodes, and other embellifhments, which it may interweave, it detains and engages the fancy; it fixes alfo ufeful circumftances more deeply in the memory. It may be executed in different ways. The poet may chufe fome inftructive fubject, and he may treat it regularly, and in form; or, without intending a great and regular work, he may only inveigh againft particular vices, or make fome moral obfervations on human life and characters, as is commonly done in fatires and epiftles. All thefe are comprehended under the denomination of didactic poetry. The higheft fpecies of it is a regular treatife on fome philofophical, grave, or ufeful fubject. Of this nature we have feveral, both ancient and modern, of great character and merit; fuch as Lucretius's fix books, "De Rerum Natura," Virgil's "Georgics," Pope's Effays "On Criticifm," and "On Man," Akenfide's "Pleafures of the Imagination," Armftrong "On Health," Horace's, Vida's, and Boileau's "Art of Poetry." In all fuch works, as inftruction is the principal object, the fundamental merit confifts in found thought, juft principles, clear and apt illuftrations. The poet muft enliven his inftructions by the introduction of fuch figures, and fuch circumftances, as may amufe the imagination, conceal the drynefs of his fubject, and embellifh it with poetical painting. Virgil, in his "Georgics," prefents us here with a perfect model. He has the art of raifing and beautifying the moft trivial circumftances in rural life. When he is going to fay, that the labour of the country muft begin in fpring, he expreffes himfelf thus:

> "Veré novo, gelidus canis cum montibus humor, &c."

Thus rendered by Dryden:

> "While yet the Spring is young, while Earth unbinds
> Her frozen bofom to the weftern winds;
> While mountain fnows diffolve againft the Sun,
> And ftreams yet new from precipices run;
> Ev'n in this early dawning of the year,
> Produce the plough and yoke the fturdy fteer,

And

And goad him till he groans beneath his toil,
Till the bright ſhare is buried in the ſoil."

Inſtead of telling his huſbandman, in plain language, that his crops will fail through bad management, his language is,

"Heu magnum alterius fruſtra ſpectabis acervum, &c."

"On others' crops you may with envy look,
And ſhake for food the long abandon'd oak."
Dryden.

Inſtead of ordering him to water his grounds, he preſents us with a beautiful landſcape:

"Ecce ſupercilio clivoſi tramitis undam, &c."

"Behold when burning ſuns, or Syrius' beams
Strike fiercely on the field and with'ring ſtems,
Down from the ſummit of the neighbouring hills,
O'er the ſmooth ſtones he calls the bubbling rills:
Soon as he clears whate'er their paſſage ſtay'd
And marks their future current with his ſpade,
Before him ſcattering they prevent his pains,
And roll with hollow murmurs o'er the plains."
Wharton.

In all didactic works, method and order are eſſentially requiſite; not ſo ſtrict and formal as in a proſe treatiſe, yet ſuch as may exhibit clearly to the reader a connected train of reaſoning. Of the didactic poets, above mentioned, Horace, in his "Art of Poetry," is moſt cenſurable for want of method. With regard to epiſodes and embelliſhments, great liberty is allowed to writers of didactic poetry. The great art of rendering a didactic poem intereſting is to relieve and amuſe the reader by connecting ſome agreeable epiſodes with the principal ſubject. The principal beauties of Virgil's "Georgics" lie in digreſſions of this kind, in which the force of the author's genius is exerted; ſuch as the prodigies that attended the death of Julius Cæſar, the praiſes of Italy, the happineſs of a country life, the fable of Ariſteus, and the moving tale of Orpheus and Eurydice. In like manner the favourite paſſages in the work of Lucretius, and which alone could render ſuch a dry and abſtract ſubject tolerable in poetry, are the digreſſions on the evils of ſuperſtition, the praiſe of Epicurus and his philoſophy, the deſcription of the plague, and ſeveral other incidental illuſtrations, which are remarkably elegant, and adorned with a ſweetneſs and harmony of verſification peculiar to that poet. A didactic poet may manifeſt great art in connecting his epiſodes happily with his ſubject. Virgil is diſtinguiſhed for his addreſs in this point. In Engliſh, Dr. Akenſide has attempted the moſt rich and poetical form of didactic writing, in his "Pleaſures of the Imagination;" and in ſeveral parts has ſucceeded happily, and diſplayed much genius. Dr. Armſtrong, in his "Art of preſerving Health," has not aimed at ſo high a ſtrain as the other; but he is more equal, and maintains throughout a chaſte and correct elegance. Among moral and didactic poets, Dr. Young ſhould not paſs unnoticed. His "Univerſal Paſſion" poſſeſſes the merit of conciſeneſs of ſtyle and lively deſcription of characters, which are particularly requiſite in ſatirical and didactic compoſitions. In his "Night Thoughts," there is much energy of expreſſion; in the three firſt, there are ſeveral pathetic paſſages, and through them all happy images and alluſions, as well as pious reflections occur. But the ſentiments are overſtrained and turgid; and the ſtyle is too harſh and obſcure to be pleaſing. Among French authors, Boileau has much merit in didactic poetry. His "Art of Poetry," his "Satires," and "Epiſtles," muſt ever be eſteemed eminent, not only for ſolid and judicious thought, but for correct and elegant expreſſion, and fortunate imitation of the ancients. See further SATIRE and EPISTLE. Blair's Lectures, vol. iii.

DIDAPPER, in *Ornithology*, the little Grebe or Dobchick; called alſo the Dipper. *Colymbus minor*. Linn.

DIDAUCANIA, in *Ancient Geography*, a town of Aſia Minor, in Bithynia.

DIDELPHIS, in *Zoology*, a genus of MAMMALIA, appertaining to the Feræ tribe, and which are briefly diſtinguiſhable by poſſeſſing the following character. The foreteeth are minute and rounded; in the upper jaw ten, with the two intermediate ones longeſt; in the lower eight, with the intermediate two broader and very ſhort: tuſks long: grinders crenated: tongue ciliated with papillæ; and in moſt ſpecies an abdominal pouch in which the teats are included.

The animals of this genus are the opoſſums of our Engliſh writers; a race of quadrupeds which, for a conſiderable period of time, were regarded as altogether peculiar to America, but later obſervations have clearly proved that opinion to be founded in error, as ſeveral ſpecies of this remarkable genus have been aſcertained to inhabit other parts of the globe. Upon the firſt diſcovery of the Weſtern continent, the ſingular conformation of ſuch an animal muſt have naturally excited aſtoniſhment; the abdominal pouch, or receptacle, in which the helpleſs litter are concealed till they attain ſufficient maturity of growth to provide for their own ſuſtenance and ſafety, was too apparent to eſcape obſervation, and muſt neceſſarily have appeared the more extraordinary, as no other claſs of beings was then known which is endowed by providence in a ſimilar manner.

In the progreſs of thoſe inquiries which mankind have ſince made in diſtant regions of the earth, we have, however, ſeen that nature has not allotted this extraordinary repoſitory for the protection of the infant brood to one tribe of quadrupeds alone. The diſcoveries of an era the moſt brilliant in the annals of natural ſcience which this country has, or may again witneſs, have introduced to our acquaintance another kind of animal poſſeſſing preciſely the ſame character, though differing in almoſt every other particular; it cannot be miſconceived that we allude to the diſcoveries of ſir Joſeph Banks and his enlightened aſſociates, in the Southern hemiſphere, and that the animal adverted to is the kanguroo. Unfortunately the opportunities which have ſince occurred of exploring thoſe vaſt and prolific regions, if not abſolutely neglected, have never been embraced by our countrymen with an ardour equal to the example diſplayed by thoſe early viſitors, or it would not have remained for the French nation to announce diſcoveries of the moſt intereſting kind, the reſult of their reſearches in the very heart of our own colonies, and which we might otherwiſe have been altogether unacquainted with! Among theſe we may name the Phaſcolome, another genus of the ſame natural order of quadrupeds, as the opoſſum and kanguroo, being, like thoſe animals, furniſhed with an abdominal pouch, and which, if we miſtake not, has hitherto remained unknown to the naturaliſts of this country. Three living animals of this genus were tranſmitted by captain Baudin of the French marine, from the coaſt of New Holland, to the national muſeum of natural hiſtory at Paris, about ſix years ago, and which arrived in the month of July 1803, by the veſſel Naturaliſte. This animal, apparently before unknown to zoologiſts, is deſcribed by profeſſor Geoffroy, in the Annales du Muſeum, under the above mentioned title of Phaſcolome, or Faſcolome. With the exception of poſſeſſing the ventral pouch, this animal is materially different in moſt reſpects from the opoſſum, and ſcarcely leſs diſtinct from the kanguroo. In the form of the head, and number, nature, and diſpoſition of the teeth, this genus agrees with the marmots.

marmot; in the abdominal pouch of the female, the marfupial bones in both fexes, and in the fyftem of the fexual organs, with the opoffum; and in the formation of the pofterior legs, with the kanguroo. The marfupial bones have been alfo obferved by Geoffroy, in that extraordinary creature, the duck-bill quadruped, *Dafyurus*, the Platypus of Dr. Shaw, and Ornithorhynchus of Geoffroy.

Thus it is evident, the character of an abdominal pouch like that of the opoffum is not peculiar to this genus of quadrupeds, but common, at leaft, to three genera of thofe at prefent known, and we might add from our own obfervations, a circumftance, not perhaps before noticed, that a fimilar provifion exifts in fome kinds of fifhes, as well as in the quadrupeds before mentioned. The exiftence of this abdominal pouch has furnifhed Vicq d'Azir with the character of a new order of quadrupeds, which he calls *Bourfens*, and of which, according to that author, there are five genera, the opoffums being divided into two genera, and the kanguroo (Pedimanes), the Platypus (Dafyure), and the new genus Phafcolome, conftituting the other three.

Moft of the true opoffums inhabit America, and live in holes in woody places, burrowing in the earth, and being of the carnivorous kind, feeding on fmall birds, poultry, reptiles, worms, and infects, and alfo on vegetables, efpecially the fugar cane. Thefe animals walk indifferently, but they climb trees, by means of their prehenfile tail, with great facility; and are often feen fuftained by the tail to the branches of trees, watching to feize upon fmall birds when they alight near them. The feet are furnifhed with five toes, the greater one of which is placed remote from the reft. The abdominal pouch is fuftained by means of two bones of a peculiar ftructure, and which in allufion to their functions have been called the marfupial bones. The opening of the vagina, which is double, and gave rife to the name of the genus, from the Greek (didelphis) is moiftened with a kind of fluid of a yellowifh colour, and fo offenfive to the fmell as to communicate its odour to the whole animal. The flefh of the opoffum is, however, occafionally introduced to table as an article of food.

Species.

Marsupialis. Teats eight, within the pouch. Schreber. *Philander Amboinenfis*, &c. Briff.

This fpecies which inhabits Amboyna, is about the fize of a large cat. The noftrils are perpendicular, and lunar; whifkers long; at each corner of the mouth eight briftles, and under the throat five: the ears oval, lax, black, with the tip white; the grinders lobate: legs black, fmooth, and befet with fhort hair; and the tail the length of the body.

Opossum. Tail hairy at the bafe: region of the eyebrows paler. *Didelphis Opoffum*, Gmel. *Semivulpa*, Gefn. *Tlaquatzin*, Hern. *Tai-ibi-Brafilienfibus*, Marcg. *Opoffum*, Catefby. *Sarigue*, Buff. *Virginian Opoffum*, Penn. Shaw's Gen. Zool.

The common or Virginian opoffum is about the fize of a fmall cat. The face is long and fharp, the mouth wide and armed with very numerous fharp teeth; the ears thin, naked, blackifh, round, and furrounded with a white border; the legs are fhort and the feet armed with fharp claws, but the interior toes or thumbs of the hind feet are flat and rounded, and have nails like thofe of the monkey tribe. The tail is blackifh at the origin and covered with longifh hair; but from that part to the extremity is naked, and covered with a fcaly fkin, the divifions of which are marked in fuch a manner as to give the tail very much the appearance of a whitifh fnake: it is ftrongly prehenfile, or poffeffed of the power of coiling, like thofe of feveral monkies, round any object from which the animal pleafes to fufpend itfelf. Its general colour is a dingy yellow white, with the legs blackifh, and belly white. The abdominal pouch is a large cavity which can be opened and clofed at pleafure. It is in this cavity the teats are fituated in which the young are placed by the parent immediately after their birth, and where they remain for fome time after, like fœtufes deftitute of hair, and adhering ftrongly to the teats. When they have attained fufficient growth and ftrength they emerge, and afterwards, while they remain young, occafionally take refuge in the fame receptacle on the appearance of danger. By this means the opoffum is enabled to carry away her litter of young with perfect facility and fafety. This receptacle for the young is common to moft of the opoffum tribe, but there are two fpecies which are deftitute of it, and have only inftead a kind of depreffion or furrow.

This animal is carnivorous and preys on poultry, fmall birds, &c. in the manner of the European polecat, and alfo feeds on various kinds of fruit. It is of a gentle difpofition, and may be eafily tamed; but, like fome other fpecies, has a difagreable fmell: its voice is a fort of grunting fqueak: its pace in running is not fwift, but it is very expert in climbing trees, and readily paffes by means of its clinging tail from bough to bough in the manner of a monkey. The female produces four or five at a birth, and has the power of clofing the pouch fo ftrongly as to make it extremely difficult to open it by the hand; nor will any torture compel the animal to loofen it. This power of ftrongly clofing the pouch is performed by certain bones and mufcles which nature has provided for that purpofe. The female, when ready to produce her young, is faid to make herfelf a neft of dry grafs, in fome bufh near the root of a tree.—A variety is defcribed by Gmelin under the name of Molucca, the back of which is dark brown, and the belly whitifh. This is found chiefly in the ifle of Ceylon.

Cayopollin. Tail longer than the body: no abdominal pouch: eyes furrounded with a black border. Schreber. *Mus Africanus; Cayopollin dictus*. Seba. *Mexican Opoffum*.

The Cayopollin inhabits the mountainous parts of New Spain where it lives on trees; it has large angular, naked, tranfparent ears, thickifh fnout, and large whifkers. The colour above is brownifh or tawny-afh, beneath pale grey or whitifh: the face whitifh with a dark line down the middle, and a blackifh or brown border round the eyes. The total length is about feventeen inches, of which the body meafures fix and the tail eleven.

Murina. Tail half naked; teats fix. Linn. *Mus fylveftris*, &c. Seba. *Marmofe*, Buff. *Murine Opoffum*, Penn.

One of the fmaller fpecies of opoffum, meafuring fix or eight inches from the nofe to the bafe of the tail, and having the tail about the fame length as the body. It is of a fomewhat flender form, with the fnout long and acute, and the mouth wide; the ears are large and rounded, and the tail naked, or fcaly throughout its length. This animal has no ventral pouch, but on each fide the lower part of the abdomen is a longitudinal furrow or fold, in the cavity of which the teats are fituated. The general colour is tawny brown above, and whitifh beneath; the eyes encircled with black. It produces ten or more young at a birth, which immediately after being brought forth affix themfelves to the teats, and remain there till they attain their proper growth and ftrength; it is a native of South America, and particularly of Surinam. The feet in this fpecies are all furnifhed with fharp claws, except on the thumbs or great toes of the hind feet, which have rounded nails.

Dorsigera. Tail at the bafe hairy, and longer than the

the body; toes of the pofterior feet unarmed. Schreber. *Genus gliris fylveftris*, Merian. *Philandre de Surinam*, Buff. *Merian opoffum*, Penn.

This fpecies, which is defcribed principally on the authority of madame Merian, is a native of Surinam; it burrows in the ground like the rabbit, and, when in danger, the young are faid to affix themfelves to the mother by twifting their tails round hers. This animal brings forth five or fix young at a litter, and is about the fize of the common rat.

Cancrivora. Tail fcaly, almoft naked, and nearly as long as the body; thumb of the pofterior feet flat. *Didelphis cancrivora*, Gmel. *Crabier*, Buff. *Cayenne opoffum*.

A native of Cayenne, firft defcribed in the Supplement to the works of Buffon. It is faid to be an animal of great activity, living on trees by day, and by night defcending into marfhy places in order to prey on crabs, which it draws out of their holes by means of its feet, or fometimes even with its tail. The colour is reddifh, tawny above, and yellowifh beneath; the fur fomewhat woolly, but befet with coarfer hairs externally, efpecially along the back, where they form a kind of mane. The face is long and flender; the ears upright, fharp, and pointed; the tail very long, taper, and naked. This animal is about three feet in length, meafuring from the tip of the nofe to the end of the tail; it grunts like a pig; brings forth from four to five young at a litter, is eafily tamed, and grows fat by domeftication. The flefh refembles that of the common hare.

Petaurus. Sides furnifhed with a flying membrane: body above blackifh-grey, beneath white; tail long, fubcylindrical, and hairy. *Didelphis petaurus, petaurine opoffum*, Shaw. Gen. Zool. *Hepoona-roo*, White's Journ. *Great flying opoffum*.

This remarkable fpecies meafures about twenty-two inches from the tip of the nofe to the beginning of the tail, which latter is twenty inches in length. The body is about the fize of a fmall rabbit, and the general appearance is fimilar to that of the flying fquirrel. Its colour is a fine fable, varied with a greyifh ferruginous caft above, the lower furface whitifh; a ftripe of deep brown runs along the back from head to tail, and the verge of the flying membrane on the upper part has a darker tinge than the reft, while the extreme edge is white. The tail is very full of long, and foft hairs of a blacker caft than the reft, efpecially towards the end. This fingular animal is enabled, by means of its expanfile lateral membranes, to fpring to a confiderable diftance at pleafure; it inhabits New Holland, where the natives diftinguifh it by the name of Hepoona-roo.

Lemurina. Cinereous, beneath tawny; tail cylindrical, black, furry, and prehenfile. *Didelphis lemurina, lemurine opoffum*, Shaw Gen. Zool. *Wha-tapoa-roo*, White's Journ.

A large fpecies, being equal in fize to the common cat, but of a more elongated form in proportion. The upper part is an iron-grey, beneath tawny, more or lefs pale. The muzzle is fhort and roundifh; whifkers large and black, the ears upright, large, and rather acuminated at the top; its eyes are bright and reddifh. The pofterior feet furnifhed with a rounded interior toe. The tail, which is very thick long, and furry, is prehenfile, and for about a fourth part of its length of the fame colour with the body, the remainder black; the tail is naked beneath to a confiderable diftance from the tip. The total length of this animal is about two feet fix inches, of which the tail alone meafures about twelve inches.

This kind, like moft others of the genus, fubfift on fmall birds, infects, and vegetables, and when they feed are obferved to fit upright in the fame manner as the fquirrel.

Obesula. Pale brown; beneath whitifh; tail rather long. *Didelphis obefula, porculine opoffum*, Shaw. Nat. Mif.

About the fize of a half grown domeftic rat; the hind legs are confiderably longer than the others, and fomewhat refemble thofe of the kanguroo; the ears are rounded, the tail rather long, and its hair more coarfe in appearance than in the reft of the fmall opoffums.

Viverrina. Black fpotted with white; tail hairy. *Didelphis viverrina, viverrine opoffum*, Shaw. Gen. Zool.

This animal is remarkable for its flender form, and in its general figure bears a ftrong refemblance to the weefel tribe. The colour is deep gloffy black, and the whole body and outfides of the limbs are marked with numerous, large, and fomewhat irregular patches of white. Mr. Hunter fpeaks of a variety which is entirely brown and immaculate.

Philander. Tail hairy at the bafe; abdominal pouch with four teats. Schreber. *Tlaquatzin*, Seba.

The philander is about the fize of a large rat; the head large, the fnout thick, and the ears rounded and erect. The tail is longer than the body, and is hairy at the bafe, the reft naked. The length of the body is nine inches, and the tail thirteen. The general colour of this animal is reddifh brown above, beneath whitifh; the eyes are furrounded with a brownifh border; and the mouth befet on each fide with whifkers. The forehead is marked with a brownifh ftripe. This fpecies inhabits Surinam.

Orientalis. Tail hairy from the bafe to the middle, and longer than the body; two middle toes of the pofterior feet united. Pallas. *Phalanger*, Buff.

The phalanger is the fize of a very large rat, meafuring about nine inches from the nofe to the tail, and the tail itfelf ten inches. The colour of the phalanger is rufous grey on the upper part, and yellowifh white beneath; the top of the head, and the back marked with a blackifh line; the tail is hairy for about two inches and a half from the bafe. Its voice is faid to refemble that of the fquirrel, and it commonly affumes the attitude of that animal when feeding.

Brunii. Tail fhort, naked; pofterior feet long and tridactylous. Schreber. *Filander*, Le Bruyn. *Javan opoffum*, Penn.

This fpecies, which is about the fize of the common hare, was firft difcovered by Le Bruyn in the ifland of Java. The head is narrow, and fhaped like that of the fox, with the ears placed erect. The general colour of the animal is pale yellowifh brown, with a brown ftripe along the forehead. The abdominal pouch is large. Bruyn refers this animal to the kanguroo tribe.

Brachyura. Tail hairy, and very fhort; ears naked; no pouch; body rufous. Schreber. *Short-tailed opoffum*, Penn.

One of the fmaller fpecies feldom exceeding the length of five inches from the nofe to the tail, and the latter about two inches. Its colour is a reddifh brown on the upper parts, and whitifh beneath. This fpecies being deftitute of an abdominal pouch, the young faften themfelves to the teats. The fur of this animal is foft and elegant, the tail very thick at the bafe, and gradually tapering to the end. It is a native of South America.

Sciurea. Sides furnifhed with a flying membrane; body above greyifh, beneath fnowy white; tail prehenfile and very hairy. *Didelphis fciurea, fquirrel opoffum*. Shaw Zool. New Holl.

The fize of this animal is nearly that of the common European fquirrel, and from the fullnefs and peculiar growth of its hair, appears rather larger. Its general colour refembles that of the American grey fquirrel. A black ftripe paffes over each eye along the top of the head; and under each

each ear is a black patch furrounded with white. The tail, which is prehenfile, is of the fame colour with the body for half its length, but the remainder is black; it is remarkably full of hair, and tapers in a flight degree towards its extremity, but does not terminate acutely. The eyes are black, rounded, and very full; the ears rather fhort, round, and very thin. The upper parts of the feet are white, and the lateral or flying membrane, which extends from the fore feet to the hind, is edged with blackifh, as in the flying fquirrels. The abdominal pouch is of confiderable fize, and is fituated, as in other opoffums, on the lower part of the abdomen. The pofterior feet are furnifhed with a rounded unarmed thumb. This curious animal is of the nocturnal kind, remaining during the greateft part of the day in a ftate of torpidity, but appearing in the night time full of vigour and activity. This fpecies inhabits New Holland.

Dr. Shaw fpeaks of a fuppofed variety which agrees in every refpect with that above defcribed, except in having the extreme half of the tail black, that part being nearly throughout of the fame grey colour with the upper furface of the animal, and only marked near the end with a black band; the tip is white.

Macroura. Sides furnifhed with a flying membrane; body cinereous above, beneath white; tail very long and black. *Didelphis macroura, long-tailed opoffum.* Shaw Zool. New Holl.

This fpecies is about the fize of a black rat, and is of a dark or brownifh grey above, the lower furface white; the head and neck are alfo whitifh; a dufky ftripe runs along the top of the head, almoft to the nofe; the ears are whitifh, moderately large, and flightly rounded; the upper parts of the fore feet are whitifh, and the pofterior half of the tail deeper black than the other part. Native of New Holland.

Pygmæa. Sides furnifhed with a flying membrane; tail flat, pinnated, and linear. *Didelphis pygmæa, pigmy opoffum.* Shaw Zool. New Holl.

The moft diminutive of the opoffum tribe, its fize being equal only to that of the common moufe. This elegant little animal is furnifhed on each fide the body with an expanfile membrane, like that of the flying fquirrel, and by the affiftance of which it is enabled to fpring to a confiderable diftance. The fur is extremely fine; its colour a foft and palifh brown above, beneath almoft white; the nofe, feet, and ears, internally, are light pink. The tail is of a flattened form, and beautifully fringed on each fide with foft, filky hairs. The opening of the abdominal pouch is of a femilunar form. The teats are extremely fmall, and only four in number. Its tongue is remarkably large and long, and of a flattened form. The fpecies is fuppofed to feed chiefly on infects and young birds.

Pencillata. Cinereous, beneath whitifh; tail at the end hairy and black. *Didelphis pencillata, brufh-tailed opoffum* Shaw Gen. Zool.

The prevailing colour of this fpecies is cinereous, or deep grey; the nofe is rather fharp; the ears moderately large, and of a very flightly pointed form at the tips; the fides of the mouth are furnifhed with very long fine briftles; and others, fomewhat fhorter, are fituated under each eye. The fides are dilated into a flying membrane. The tail is thin and afh-coloured for nearly half its length, beyond which it is jet black, with long and fine hairs difpofed in a brufh-like form. Its fize is that of the black rat. Native of Auftralafia.

Vulpina. Ferruginous; tail hairy and black. *Didelphis vulpina, vulpine opoffum.* Phillip's Voy. New South Wales.

This is one of the larger fpecies of opoffum, meafuring about twenty-fix inches from the nofe to the bafe of the tail, and the tail itfelf being fifteen inches in length. The general colour is dufky grey, with a rufous tinge above, and being tawny buff colour, deepeft on the throat. The tail is of the fame colour with the back for about one-fourth of its length, and from thence to the end black. It is conjectured that this may in reality be no other than the lemurine opoffum, *Didelphis lemurina.*

Ursina. Yellowifh, with the upper lip bifid. Shaw Gen. Zool.

A fpecies of large fize very lately difcovered in New Holland.

It fhould be laftly obferved, that Gmelin includes the kanguroo in the didelphis genus, under the fpecific name of *gigantea*, a circumftance that muft have arifen from inattention to the ftructure and arrangement of the teeth and other effential characters, which at once remove that fingular animal from the didelphis tribe. See Kanguroo.

DIDELTA, in *Botany*, (from δις, *double*, and δελτα, the Greek letter Δ, in allufion to the form of the fructifying difk, which refembles one equilateral triangle within another;) L'herit. Stirp. t. 28. Ait. Hort. Kew. v. 3. 256. Schreb. 590. Willd. Sp. Pl. v. 3. 2262. Juff. 182. Lamarck t. 705. Clafs and order, *Syngenefia polygamia-fruftranea.* Nat. Ord. *Corymbiferæ, Sect.* 2. Juff.

Gen. Ch. *Cal.* the common one double: outermoft in three deep, ovate, widely-fpreading fegments; inner in 11 or 12 unequal, linear-lanceolate, pointed, fpreading fegments, alternately fmaller. *Cor.* compound, radiated: florets of the difk hermaphrodite in ftructure, numerous, funnel-fhaped, five-cleft; thofe in the central triangle in effect barren, the furrounding ones fertile: florets of the radius 11 or 12, female, but abortive, ligulate, with three or four teeth, longer than the calyx, and oppofite to its twelve internal fegments. *Stam.* Five in all the florets of the difk; filaments capillary, very fhort; anthers united into a tube: in thofe of the radius folitary and obfolete. *Pift.* Germen in the external florets of the difk oblong, compreffed, immerfed in the receptacle; ftyle thread-fhaped; ftigma cloven, revolute: in the central ones the germen is minute and roundifh: in the marginal ligulate florets is fcarcely the rudiment of any. *Peric.* None. *Receptacle* fplitting into three portions, each of which has one large fegment of the calyx, and fome of the fmaller inner ones, adhering to it, and contains feveral feeds in its cells. *Seeds* none, either in the central or radiant florets; in the external florets of the difk oblong; down fhort, fimple, rigid. The common receptacle is triangular, divided into four triangular parts, of which the central one is naked, the reft fungous and briftly. Eff. Ch. Receptacle briftly, triangular; its centre triangular and barren. Down of many fcales. Outer calyx in three deep fegments; inner in many. 1. D. *carnofa.* Ait. Hort. Kew. v. 3. 256. Willd. Sp. Pl. v. 3. 2262. (D. tetragoniæfolia; L'herit. Stirp. Nov. 55. t. 28. Polymnia carnofa; Linn. Suppl. 384. Choriftea carnofa; Thunb. Prod. 163.) Succulent-leaved Didelta. "Leaves alternate, lanceolate-oblong, flefhy." Grows at the Cape of Good Hope in fandy ground. It was fent to Kew garden in 1774, by Mr. Maffon, and is kept in the green-houfe, flowering in July. Stem fhrubby, branched, angular, fpreading. Leaves from an inch to two inches long, thick and juicy, entire, obtufe, fomewhat downy beneath. Flowers on long, fimple, folitary, terminal ftalks, large and handfome, yellow or orange. Calyx with prickly teeth. 2. D. *fpinofa.* Ait. Hort. Kew. v. 3. 256. Willd. Sp. Pl. v. 3. 2262. (Polymnia fpinofa; Linn. Suppl. 384. Choriftea fpinofa; Thunb. Prod. 163.) Oppofite-leaved Didelta. "Leaves oppofite, ovate, half clafping the ftem." Found at the Cape of Good Hope, by Thunberg

Thunberg and Masson, the latter of whom sent it to Kew, in 1774. It flowers in June and July, and requires the shelter of a green-house. Hort. Kew. "Stem shrubby, erect. Leave broad-ovate somewhat heart-shaped, smooth, with prickles above their insertion. Calyx entire; the outermost of 5 leaves or segments." Linn.

DIDEROT, Denys, in *Biography*, an eminent French writer, was son of a cutler at Langres, where he was born in 1713. He was educated among the Jesuits, who, finding him a youth of excellent talents, were very desirous of retaining him in their society, but he was ill inclined to adopt the ecclesiastical profession, and his father sent him to Paris to finish his studies, intending to bring him up to the business of the law. Literature, however, was his delight, and so intent was he in improving his mind, that he neglected the duties of his situation. His father was offended at his conduct, and refused, for some time, to continue his usual support. But he had a mind calculated to rise above trifling obstacles, and continued his studies in physics, geometry, and metaphysics; in these and in the belles lettres he made very considerable progress. When he was about thirty years of age he commenced author, and one of his earliest publications was a translation of "Stanyan's History of Greece" from the English. In 1745, he published a small work, entitled "Principles of Moral Philosophy," and in the following spring he published his "Pensées Philosophiques," by which he obtained considerable celebrity. From this period he was received as a disciple of the new philosophy; and became at length one of its ablest advocates. He republished his "Pensées" under the title of "Etrennes aux Esprits forts," when it was very generally circulated, and contributed much to the prevalence of those opinions for which France has the last half century been distinguished. It was at this period that Diderot, in conjuncture with d'Alembert, laid the foundation of the "Dictionnaire Encyclopedique," which was intended not only as a magazine of every species of human knowledge, but as an engine to subvert all established opinions. The first edition of this work was published between the years 1751 and 1767, in 28 vols. folio. To this, as editor, Diderot gave the labour of almost twenty years, but allowing himself time for the publication of many separate works; of which, some have done credit to his talents, and others, particularly his "Bijoux Indiscreets," have injured his reputation, and have been highly injurious to the morals of his countrymen. His writings have been characterized, and justly, as "containing a glaring mixture of good and bad, of brilliant thoughts, and obscure reasoning; of sentences that dart from the imagination with the energy of lightning; and cloudy periods of metaphysical rhetoric, that convey either no ideas, or false ones. This great dictionary, though very popular, did not remunerate the editors for the time and labour which it occupied. Diderot was obliged, when it was finished, to sell his library; he fortunately met with a liberal purchaser in the empress of Russia, who paid him 50,000 livres for it, and left him the use of it during life. She and the great Frederic were the avowed disciples of the French school. This able writer on mathematics, mechanics, arts, and manufactures, all which he had explored, extended his inquiries and reflections to music: and while M. Bemetzrieder, a disciple of Schobert, was teaching his daughter on the piano-forte, M. Diderot contrived generally to be present at the lecture, and drew up, in dialogues between master and scholar, the most pleasing and clear elementary treatise on the principles of music, and the art of performing on that instrument, which has perhaps ever been printed in any language.

"The dialogue is as lively as in the best written comedies." Among his miscellaneous works there is an excellent essay on acoustics. His knowledge, perseverance, and acquirements, seem to have been unlimited.

He, d'Alembert, the abbé Arnauld, and M. Suard, were among the first in France to feel the superior merit of Italian music, over the old French style of Lulli and Rameau, which contributed much to its disgrace whenever an opportunity offered for a parallel. Unfortunately, Diderot was as confirmed a philosopher as Voltaire, which, when generally known, caused the doors of almost all the great academies in Europe to be shut against him, and prejudiced the friends of religion against his other writings, however excellent. During the musical reform that was attempting in France, he made remarks and reflections on the subject, sufficient to fill a 4to. vol. which still remains in manuscript, and in the hands of the writer of this article, to whom he presented them more than thirty years ago, but little use has been made of these remarks hitherto; yet in the course of drawing up the musical articles for the present Cyclopædia, they will not be forgotten. Diderot died suddenly, as he was rising from table, in July, 1784.

DIDIER, Saint, in *Geography*, a small town of France, in the department of the Rhone, 3 miles from Lyons; also a small town of France, in the department of the Loire, not far from St. Etienne.

Didier, *Saint, et la Séauve*, a small town of France, in the department of the Upper Loire, district of Yssengeaux, chief place of a canton, with a population of 3175 individuals. The canton has 7 communes, and 10,458 inhabitants, upon a territorial extent of $152\frac{1}{2}$ kiliometres.

DIDIUS Julianus, *M. Salvius Severus*, in *Biography*, a Roman emperor, who, in early life, had been employed in public stations, and who, A. D. 179, was made consul with Pertinax. In the reign of Commodus he was accused of some state offences, of which he was acquitted; but whether on account of his innocence, or by means of his wealth, does not appear. At that period of the empire almost every thing was attainable by riches. Julian had accumulated a prodigious sum, to which he owed his elevation to the throne. When Pertinax was dethroned and murdered, the soldiers resolved that the crown should be transferred to the highest bidder. The news quickly spread over the city, and reached the ears of Didius Julianus, who, regardless of the public calamities, was indulging himself in all the luxuries that his wealth could command. His wife and his daughters, his freedmen and his parasites, easily convinced him that he deserved the throne, and conjured him to embrace the favourable opportunity. He immediately repaired to the camp, where Sulpicianus had already began to bargain with the soldiers. Didius in an instant made a large advance upon his offer, and raised the bribe to 200*l*. sterling *per* man. The gates of the camp were instantly thrown open to the purchaser; he was declared emperor, and received the oath of allegiance from the soldiers, who retained so much humanity as to stipulate that he should pardon and forget the competition of Sulpicianus. The Prætorians placed their new sovereign in the centre of their ranks, surrounded him on every side with their shields, and conducted him in close order of battle through the deserted streets of the city. The senate was commanded to assemble, who, through fear, ratified the infamous transactions. They congratulated their own, and the public felicity; engaged their allegiance, and conferred on the new emperor all the branches of imperial power. He was next conducted to the palace, where he beheld the abandoned trunk of Pertinax, and the frugal entertainment that had been prepared for his supper. The one he viewed with apparent indifference, the other with contempt. A banquet was prepared by his order, and he amused himself till a late hour, with dice, and the performances of a celebrated dancer.

dancer. It was obferved, that when left to darknefs, folitude and himfelf, he paffed a fleeplefs night, reflecting on the dangerous tenure of an empire that had not been acquired by merit,but purchafed by money. "He had," fays the eloquent hiftorian, "reafon to tremble. On the throne of the world he found himfelf without a friend, and even without an adherent. The guards themfelves were afhamed of the prince whom their avarice had perfuaded them to accept, nor was there a citizen who did not confider his elevation with horror, as the laft infult of the Roman name." The people refufed the proffered liberality of the emperor; infulted his perfon, and waited with anxiety for the armies in the diftant provinces, as avengers of the public wrongs. The approach of Severus, who had been declared emperor by the Pannonian legions, foon brought on the crifis of his fate. He was detefted by the Prætorians; was formally depofed, and fentenced to death. He met with no compaffion, but ended, like a common malefactor, his wretched reign of fixty-fix days, at the age of fixty. Gibbon.

DIDO, in *Fabulous Hiftory* and *Mythology*, the furname of the princefs Elifa, who is faid to have founded Carthage. She was the daughter of Belus II. king of Tyre, in Phœnicia. When her brother Pygmalion afcended the throne after the death of his father, and Elifa was married to Sicharbas, the prieft of Hercules, his mother's brother, who was immenfely rich; the dread of Pygmalion's avarice induced them to keep fecret this great wealth. Pygmalion, however, conjecturing that that was the cafe, cruelly murdered the hufband of his fifter. Elifa, diffembling her refentment, and profeffing her defire to leave a place where her grief was renewed, took up her abode with Pygmalion. The king, prefuming that fhe would bring with her the treafure of her hufband, fent her a fhip and convoy; but before fhe fet fail, fhe artfully contrived to lodge in the fhip fome bales loaded with fand; and having reported that fhe was going to facrifice to the manes of her hufband what fhe chiefly valued, fhe took an opportunity of throwing thefe bales into the fea; and then told the foldiers, who accompanied her, that they contained the money of Sicharbas, and that they had no alternative for their own fafety but that of flying with her; for as foon as Pygmalion found that they were come without the expected treafure, he would put them all to death. Accordingly they firft landed in Cyprus, whence Dido carried off 50 young virgins, whom fhe gave in marriage to the companions of her expedition. They were afterwards driven by the winds on the coaft of Africa, where this princefs erected a citadel, near which Carthage was afterwards built. It has been faid by fabulous tradition, that Dido bought of the inhabitants of the country as much ground as a bull's hide would enclofe; and that fhe cut this into a great number of thongs, which encompaffed a fpace of ground fufficient for the fite of a citadel, which was hence called *Byrfa*, *i. e.* a bull's hide; and it has been farther faid, that in digging the foundation, they found a horfe's head, which prefaged its future grandeur. See CARTHAGE.

After the Phœnicians, whom Dido led into this part of Africa, had made their fettlement there, they attempted to compel the princefs to marry Iarbas, king of Mauritania: but fhe difappointed their views, by firft erecting a funeral pile, as if by fome facrifice fhe intended to appeafe the manes of her former hufband, and afterwards putting an end to her life with a poniard. From this action, it is faid, fhe obtained the name of Dido, importing *valiant woman*: but Virgil, by a ftrange reverfe of hiftory, reprefents her as being fo much in love with Æneas, that his departure drove her to defpair. But it is remarkable, that he makes an anachronifm of almoft 300 years, as there is no lefs an interval between Æneas and Dido; for, notwithftanding a variety of opinions about the time in which fhe lived, it is generally agreed that it was later than that of the Trojan heroes by fome ages: Troy having been taken in the time of the judges, and Pygmalion, Dido's brother, having been born in the reign of Joram, king of Judah, about 889 years B.C. Accordingly Bochart makes Dido to have been aunt to the famous Jezebel, whom Ahaz married, and who brought fo many calamities upon the kingdom of Ifrael. Moreover, Dido left the kingdom of Tyre in the 7th year of Pygmalion's reign, about 300 years after the taking of Troy, and between eight and nine hundred years B. C. After her death her fubjects afcribed to her divine honours and paid her religious worfhip. Sir Ifaac Newton, in his Chronology, reprefents Æneas and Dido as contemporaries in the year 883, B. C.; when, as he fays, Dido built Carthage, and he ftates the capture of Troy to have happened in the year 904 B.C., which others refer to 1184 B. C.

DIDRACHM, from δις, *double*, and δραχμα. See DRACHM.

DIDUGUA, in *Ancient Geography*, a town of Afia, in Babylonia.

DIDURI, a people of Afiatic Iberia, according to Pliny. Ptolemy places them in Sarmatia, in the vicinity of the Cafpian fea.

DIDUS, in *Ornithology*, a genus of the gallinaceous tribe. The bill is ftraightened in the middle with two tranfverfe wrinkles, and both mandibles are bent in at the tip; the noftrils are placed obliquely near the edge of the middle of the bill; face naked beyond the eyes; legs fhort, thick; feet cleft; wings unfit for flight. DODO.

Species.

INEPTUS. Greyifh; wings and tail cinereous yellow; head hooded. *Didus ineptus*, Linn. *Raphus*, Brif. *Cygnus cucullatus*, Raii. *Hooded Dodo*, Lath. Edw. &c.

The exiftence of this uncouth bird has been difputed, though not in our opinion with fufficient reafon, for although this curious creature has not been feen by any modern traveller, or naturalift, the evidence of thofe refpectable authors who defcribed it in the early part of the 17th century, ought not to be rejected. The Dutch are faid to have found it in the ifle of Mauritius, and to have given it the name of Dodaerts, and Walgh-vogel; the name Dodo is that by which the Portuguefe diftinguifhed it, and the French called it Cygne à capuchon, and autruche encapuchonnée, but the name under which it was firft noticed by them is Dronte.

In Herbert's travels, publifhed in 1634, an account of this bird is inferted, accompanied by a rude and indifferent figure, under the name of Dod-eerfen. He informs us that "it feldom weighs lefs than fifty pounds. The bill is hooked and bent downwards; the thrill, or breathing-places in the midft; from which part, to the end, the colour is of a light-green, mixed with pale yellow; eyes round and bright; has fine down inftead of feathers; the train (like to a China-beard) is no more than three or four fhort feathers; the head varioufly dreffed, one-half being hooded with down of a dark colour, the other half naked, and of a white hue, as if lawn were drawn over it; the legs thick and black, and the talons great. The pace, he fays, is flow, and the body round and fat; by fome eaten as meat, but more pleafureable to look than feed upon, and her ftomach fo fiery that it can eafily digeft ftones; in that fhape not a little refembling the oftrich." A painting of this bird is preferved in the Britifh mufeum, to which Edwards is indebted for the following defcription, and from which alfo the various figures of the Dodo, in that, and later publications, are evidently copied.

According to Edwards, this bird is rather larger than the ſwan, and nearly three feet in length. The bill is ſtrong, large, and hooked at the end; the gape ſtretches beyond the eyes, and is of a pale blue colour, except the end of the upper mandible, which is yellowiſh, and a red ſpot on the bend of it; the end of the lower blackiſh; irides white; the general colour of the plumage cinereous, and ſoft to the touch; the belly and thighs whitiſh; the head large, and ſeems as it were covered with a black hood or cowl; the wings are very ſhort, and of a yellowiſh aſh-colour; the tail-feathers curled, ſtand upon the rump, and incline to yellow, like the wings; the legs have four toes, three before, and one behind, and are very ſtout, ſhort, and yellowiſh, and armed with black claws.

Gmelin affirms that the didus or dodo family has no tail; the caudal feathers are certainly not placed at the extremity of the body as in other birds, but conſiderably higher upon the back, and aſſuredly from their ſituation rather deſerve the epithet of a dorſal tuft than tail. The ſame writer obſerves alſo that the hooded dodo has no claws or toe-nails: upon what authority this writer ſpeaks we cannot preſume to determine, but the ſame aſſertion has been ſince made by Sonnini. We are aware that an opinion did prevail to this effect, till the recent diſcovery made in the Britiſh Muſeum, of the legs of a large bird, conjectured to be thoſe of the hooded dodo, and which appear, at leaſt for the preſent, to diſcountenance that idea, the toe-nails in thoſe relics being not only viſible but very conſpicuous.

Solitarius. Varied grey and brown; wings ſhort and terminating in a rounded knob. Lath. *Didus Solitarius*, Gmel. —*Le Solitaire*, Buff.—Solitary Dodo.

Nearly as large as the former. This ſpecies is an inhabitant of the iſle of Rodrigue, where it is not uncommon, but never appears in large flocks, ſcarcely more than two being ever found together: it makes its neſt in retired places of the leaves of the palm, about eighteen inches in thickneſs, and lays one egg, which is larger than that of the gooſe. The male ſits in his turn, or ſtands on the watch, and will not ſuffer any bird to approach within a moderate diſtance of the neſt while the hen is ſitting, which continues for ſeven weeks. They are chaſed in the winter ſeaſon between March and September, being then very fat, and the young birds in particular much eſteemed at that time for the table.

This bird bears ſome reſemblance to the turkey; the legs are as in that bird, but longer, and the bill is more bent in proportion. The neck is of a proportionable length, and the eyes black and lively: the general colour of the plumage is grey and brown mixed, and it has ſcarcely any tail: the wings are too ſhort for flight, and the hind parts are rounded like a horſe's rump, and clothed with feathers. The females are ſometimes covered with brown and light yellow feathers, and appear very beautiful. This ſex has a kind of widow's peak above the bill; and the feathers on each ſide enlarge into two white tufts: the feathers of the thighs are rounded at the end like ſhells, and this conſtitutes the principal character of the ſpecies.

Nazarenus. Body entirely downy and black. Lath. —*Didus nazarenus*, Gmel.—*Oiſeau de Nazareth*, Buff.— Nazarine Dodo.

This is rather larger than the ſwan: the bill is a little bent downwards and large; and inſtead of feathers the whole body is covered with a black down: the wings conſiſt of feathers, and there are ſome frizzled feathers upon the rump which ſupply the place of a tail: the legs are long and ſcaly, and, unlike the two former birds, there are only three toes on each foot inſtead of four.

The ſpecies was met with in the iſle of France, and is deſcribed by Caiſche a French writer. This bird forms its neſt of leaves and dry herbs in the foreſts on the ground, and lays only a ſingle egg, which is large and white.

DIDWANA, in *Geography*, a town of Hindooſtan, in the country of Agimere; 30 miles N. E. of Nagore, and 51 N. of Agimere.

DIDYMA, a fountain of Greece, in Theſſaly.—Alſo, two ſmall iſlands; near that of Scyros.—Alſo, one of the Æolian iſles near Sicily.—Alſo, a town of Africa in Libya.

DIDYMÆUS, in *Mythology*, an appellation given to Apollo.

DIDYMANDRA, in *Botany*, (from διδυμος, *a twin*, and ανηρ, *a man*, in alluſion to the two anthers upon one filament.) Willd. Sp. Pl. v. 4. 971. (Synzyganthera, Ruiz. and Pavon. Prodr. 137. t. 30.) Claſs and order, *Polygamia Monœcia*; Willd. Nat. Ord. *Amentaceæ*.

Eſſ. Ch. Catkin cylindrical, with imbricated ſcales, bearing united as well as female flowers.

United Fl. Cal. deeply four-cleft. Cor. deeply four-cleft. Filament ſolitary, bearing two anthers at its ſummit. Germen ſuperior. Styles three, very ſhort. Berry with three cells. and three ſeeds.

Female, Cal. and Cor. with Styles and Berry as in the former.

1. D. *purpurea*. Willd. (Synzyganthera purpurea; Ruiz. and Pavon. Syſt. Veg. Fl. Peruv. v. 1. 273.) A native of umbrageous woods in Peru. The tree is ſaid by the Spaniſh botaniſts to be near forty feet high, with oblong-lanceolate pointed leaves. From them Willdenow has adopted the above characters, very properly changing their uncouth name, as it had not as yet found its way into any book in common uſe.

DIDYMELES, (from διδυμος, *a twin*, and μηλις, *an apple*, becauſe, as we preſume, the fruit grows in pairs.) Aubert Hiſt. Inſ. Afr. 23. t. 3. Willd. Sp. Pl. v. 4. 648. Claſs and order, *Diœcia Monandria*. Nat. Ord. *Amentaceæ*?

Eſſ. Ch. Male, Flowers in pairs, joined at the baſe. Cal. a ſcale. Cor. none. Anther ſeſſile.

Female, Fl. in pairs, joined at the baſe. Cal. a ſcale. Cor. none. Style none. Stigma of two lobes. Drupa with one ſeed.

1. D. *madagaſcarenſis*. Willd. loc. cit.

"A tall tree, found in Madagaſcar. The leaves are alternate, ſtalked, oblong, tapering at the baſe, entire, veiny. Male flowers panicled, female ones ſpiked. Flowers always in pairs." Willd.

DIDYMI, Διδυμοι, the ſame with *gemelli*, or *twins*.

Didymi, in *Ancient Geography*, mountains of Greece, in Theſſaly.—Alſo, a gulf of the iſle of Crete.

DIDYMODON, in *Botany*, an Hedwigian genus of moſſes, the teeth of whoſe fringe are approximated in pairs. It is referred by Dr. Smith to *Trichoſtomum*, which ſee.

DIDYMOTICHOS, in *Ancient Geography*, a ſmall town of Thrace, near the river Hebrus.—Alſo, a place of Aſia Minor, in Caria.

DIDYMUS, in *Biography*, a grammarian of Alexandria, who flouriſhed in the age of Auguſtus, and who is celebrated for having compoſed nearly four thouſand books, none of which have come down to us. Seneca ſpeaks of the ſubjects which Didymus diſcuſſed as trifling in themſelves, or, as he ſays, ſubjects which are forgotten, or which ought to be forgotten if they were known.

Didymus, of Alexandria, preſident of the catechetical ſchool in that city, flouriſhed in the fourth century. When he was but four years old he loſt his ſight, yet ſo vigorous and intenſe was his application, that he became deeply learned in many branches of ſcience. As he advanced in life he diligently ſtudied the ſcriptures of the Old and New Teſtament, on which he wrote ſeveral judicious and learned com-

mentaries, and fo converfant was he in controverfial theology and ecclefiaftical hiftory, that, from his fuperior merit only, he was elected to fill the chair of the Alexandrian fchool. St. Jerome and other celebrated characters were among his fcholars, who never loft an opportunity of fpeaking loudly of the pre-eminence and learning of their mafter. Jerome pronounced him to be the moft learned man of the age, and Palladius affirms that he furpaffed all the ancients in the extent and variety of his knowledge. He was author of many learned works, of which one only has reached us; *viz.* "A Treatife on the Holy Spirit," tranflated into Latin by his fcholar, St. Jerome, and inferted among the works of that father.—Moreri. Lardner.

Didymus, an eminent mufician of Alexandria, and, according to Suidas, cotemporary with the emperor Nero, by whom he was much honoured and efteemed. This proves him to have been younger than Ariftoxenus, and more ancient than Ptolemy, though fome have imagined him to have preceded Ariftoxenus. He wrote upon grammar and medicine, as well as mufic; but his works are all loft, and every thing we know at prefent of his harmonical doctrines is from Ptolemy, who, by difputing, preferved them. However, this author confeffes him to have been well verfed in the canon and harmonic divifions, and if we may judge from the teftimony even of his antagonift, he muft have been not only an able theorift in mufic, but a man of confiderable learning. As this mufician preceded Ptolemy, and was the firft who introduced the minor tone into the fcale, and, confequently, the practical major 3d $\frac{4}{5}$, which harmonized the whole fyftem, and pointed out the road to counterpoint, an honour that moft critics have beftowed on Ptolemy, he feems to have a better title to the invention of modern harmony, or mufic in parts, than Guido, who appears to have adhered, both in theory and practice, to the old divifion of the fcale into major tones and limmas.

"The beft fpecies of diapafon," fays Doni, "and that which is the moft replete with fine harmony, and chiefly in ufe at prefent, was invented by Didymus. His method was this: after the major femitone E F $\frac{16}{15}$, he placed the minor tone in the ratio of $\frac{10}{9}$, between FG, and afterwards the major tone $\frac{9}{8}$ between G A; but Ptolemy, for the fake of innovation, placed the major tone where Didymus placed the minor." Ptolemy, however, in fpeaking of Didymus and his arrangement, objects to it as contrary to the judgment of the ear, which requires the major tone below the minor. The ear certainly determines fo with us: is it not therefore probable, that in Ptolemy's time the major key was gaining ground? Upon the whole, however, it appears, that thefe authors only differ in the order, not the quality of intervals.

Didymus, in *Ancient Geography*, a mountain of Afia Minor, named *Dindyma* by Steph. Byz. Herodotus places here the fource of the river Hermus.

Didymus, or *Didymi*, mountains of Arabia Felix, in the country of the Sachalites. Ptolemy.

DIDYNAMIA, in *Botany*, (from δὶς, and δύναμις, *power*, implying the fuperiority of two ftamens over the reft,) the 14th clafs of the Linnæan artificial fyftem, but which is in itfelf a natural clafs, or nearly fo, comprehending almoft all the ringent and perfonate flowers. Its character confifts in having four ftamens, two of which are longer than the other two. The natural character of the flowers is as follows. *Cal.* Perianth of one leaf, erect, tubular, permanent, five-cleft, more or lefs irregular or unequal. *Cor.* of one petal, erect, irregular, its tube fecreting or containing honey; its limb ufually two-lipped and ringent. *Stam.* Filaments four, linear, parallel, inferted into the tube, moftly curved, according to the direction of the upper lip, fometimes divaricated as they fade; anthers cohering in pairs, moftly overfhadowed by the upper lip. *Pift.* Germen almoft always fuperior; ftyle fimple, except in *Perilla*, thread-fhaped, parallel to and between the filaments, and flightly curved like them; ftigma ufually bifid. *Peric.* either wanting, as in the firft order, where the calyx fupplies its place; or capfular, fometimes pulpy, and moftly of two cells. *Seeds* if naked four, except in *Phryma;* if covered generally very numerous. The orders of this clafs are two: 1. *Gymnofpermia*, in which the feeds are naked. Of this the plants are often aromatic, and never poifonous. 2. *Angiofpermia*, feeds in a feed-veffel, in which are many beautiful, though feveral poifonous and fœtid plants. In this order, and in the former, though much more rarely, the flowers occafionally become regular and then have five equal ftamens, as in feveral fpecies of *Antirrhinum*, and fome *Bignoniæ* and *Chelones*. S.

DIE. See Dye.

Die, *Dea Vocontiorum*, in *Geography*, a fmall town of France, in the department of the Drôme, chief place of a diftrict of the fame name, fituated in a fine valley on the river Drôme; 27 miles S. E. of Valence, 45 N. W. of Gap, 36 S. W. of Grenoble, and 450 S. by E. of Paris. Lat. 44° 44′. Its canton has a territorial extent of 430 kiliometres, 15 communes, and 7975 inhabitants, of whom the town itfelf contains 3968.

As chief place of a diftrict, Die has a fub-prefect, a court of juftice, and a regifter-office. Mount Orel, in its neighbourhood, has a fpring of mineral water, which is confidered as a fpecific remedy againft intermittent fevers.

The foil of the diftrict of Die is mountainous and not very fertile: it produces, however, fome corn, and has good orchards. The paftures are favourable for the rearing of cattle. There are a few manufactures of woollen and linen cloth. The whole diftrict counts nine cantons, 117 communes, and 58,090 inhabitants, upon a territorial extent of 2430 kiliometres.

Die, *Saint*, in Latin *Sanctus Deodatus*, a fmall town of France, in the department of the Vofges, chief place of a diftrict of the fame name, fituated on the river Meufe, which runs through the town; 30 miles W. of Scheleftat, 36 S. E. of Luneville. Lat. 48° 20′. The extent of its canton is 225 kiliometres; it has 22 communes, and 14,925 inhabitants, 5346 of whom inhabit the town. St. Dié has a fub-prefect, a court of juftice, and a regifter office.

The plains in this diftrict produce rye, oats, millet, and potatoes; the mountains are covered with forefts of pine. The paftures are good, and there is fine flax grown, of which the inhabitants make excellent linen cloth, tape, and thread; which articles, together with cattle, iron, hardware, jewellery, timber, and firewood, conftitute their principal trade. There are copper mines at Luffe, Fraize, and Lubirce, lead and filver mines at La Croix, and an iron mine at the foot of a mountain called the Donon. At Chipal there are alfo feveral kinds of mines, and a fine quarry of variegated marble. The diftrict of St Dié has a territorial extent of 1515 kiliometres, nine cantons, 108 communes, and 75,298 inhabitants.—Alfo a fmall town of France, in the department of the Puy-de-Dôme, chief place of a canton, in the diftrict of Clermont, with a population of 1200 individuals. The canton has 10 communes and 12,727 inhabitants, upon a territorial extent of $177\frac{1}{2}$ kiliometres.—Alfo, a fmall town of France, on the river Loire, in the department of Loire and Cher, 12 miles E. of Blois.

DIEBACH, a town of the duchy of Luxemburg; four miles W. S. W. of Luxemburg.

DJEBAIL, the ancient *Byblos*, a town of Syria, the moft

moſt conſiderable in the country of Kefraouan, which extends from Nahr-el-Kelb, paſſing by Lebanon, as far as Tripoli. It has not, however, above 6000 inhabitants. The ancient port reſembles that of Latakia, but is in a worſe ſituation; ſcarcely any traces of it remaining. The river Ibrahim, the ancient Adonis, two leagues to the ſouthward, has the only bridge to be ſeen, that of Tripoli excepted, from thence to Antioch. It has a ſingle arch, 50 feet wide, and upwards of 30 high; of an architecture, which appears to be the work of the Arabs.

DJEBAL, or High-lands, one of the general diviſions of Yemen, in Arabia; the other being *Tehama*, or the Low-lands. The latter contains ſix of thoſe governments into which the kingdom of Sana is ſubdivided, and the former 24.

DIE'CKIRCH, a ſmall town of France, in the department of the Foreſts, (des Forêts) chief place of a diſtrict of the ſame name, on the river Sarre, with a population of 2513 individuals. Its canton has a territorial extent of $207\frac{1}{2}$ kiliometres, 10 communes, and 8909 inhabitants.

As chief place of a diſtrict, Dieckirch has a ſub prefect, a court of juſtice, and a regiſter office. It contains many tan-yards, and ſome manufactures of woollen cloth. The vine grows on the hills in the neighbourhood of Vianden. There is a mine of very fine copper, the working of which is ſtopped for want of hands.

The whole diſtrict contains five cantons, 70 communes, and 38,128 inhabitants, upon a territorial extent of $1287\frac{1}{2}$ kiliometres.

DIEDRAVA, a village of Ruſſia, on the road from St. Peterſburg to Moſcow; 361 verſts from St. Peterſburg.

DIEGO d'Alvarez, an iſland in the Southern Atlantic ocean, whoſe bearing and diſtance from the iſlands of Triſtan d'Acunha, according to the general chart of Capt. Cook's Third Voyage, are 38° 53′ S. and 13° W.

Diego *Garcia*, or Chagos, an African iſland in the Indian ſea. Rochon, in his "Voyage to Madagaſcar," ſays, that it is 12 leagues in circumference; and that its form reſembles a horſe-ſhoe. Its greateſt breadth is not above $\frac{1}{4}$ of a league: the ground, however, is ſufficiently elevated to ſerve as a fence and ſhelter to a vaſt reſervoir or canal, which affords ſpacious room to the moſt numerous fleets. This canal is four leagues long, and its main breadth about one league. Its excellent harbour has two entrances to the ſouth. The roads are very fine. He aſcertains its ſituation to be in S. lat. 7° 14′, and E. long. from Paris 68°.

Diego *de Ramirez*, an iſland near the coaſt of Terra del Fuego, S.S.W. of cape Horn. S. lat. 56° 39′. W. long. 68° $1\frac{1}{4}$′.

Diego *Rias*, or *Rodriguez*, an iſland of Africa, in the Indian ocean; 100 leagues E from the iſland of Mauritius, or iſle of France. S. lat. 19° 30′. E. long. 57° 32′.

Diego *Sourez*, an iſland in the Indian ſea, near the eaſt coaſt of the iſland of Madagaſcar.

Diego, *Cape, St.* the low point that forms the north entrance of the ſtrait of La Maire, on the eaſt coaſt of Terra del Fuego. S. lat. 54° 33′. W. long. 65° 14′.

DIELCYSTINDA, among the *Ancients*, a kind of exerciſe performed by boys, who, being divided into two parties, or ſides, each endeavoured to draw the other over to their ſide, and the party which prevailed gained the victory.

DIELE, in *Geography*, a river of European Turkey, which runs into the Pioth, near Czezora.

DIELETTE, a ſmall town of France, in the department of La Manche, with an inconſiderable harbour in the Engliſh channel, which was finiſhed in 1731; 5 miles S.W. of Cherbourg.

DIEM Clausit Extremum, in *Law*, a writ iſſued out of chancery to the eſcheator of the county, upon the death of any of the king's tenants *in capite*, to enquire, by a jury, of what lands he died ſeiſed, and of what value, and who was the next heir to him.

DIEMEN, Anthony Van, in *Biography*, a governor of the Dutch Eaſt-India ſettlements, was born at Kuilenburg. He went, in early life, in a low military capacity to India, where he was chiefly employed in writing petitions for the ſoldiers. He was afterwards promoted to a poſt under government, which required ſome ſkill in accounts: hence he became a merchant, and afterwards accountant-general of the Dutch ſettlements in India. In 1625, he was appointed a member of the ſupreme council, and in 1631 he returned to Holland as commander of the India fleet. He remained but a few months in Europe, and when he went back to India many important offices devolved on him. In 1642, he ſent out two ſhips to explore the unknown countries to the ſouth, part of which, forming the ſouthern extremity of New Holland, was, in honour of him, diſtinguiſhed by the appellation of "Van Diemen's land." He died in April 1645, having held, with much reputation, the ſupreme power in India upwards of nine years. Gen. Biog.

Diemen, in *Geography*, a town of Holland; 4 miles S.E. of Amſterdam.

Diemen, *Straits of*, lie between the coaſt of Aſia, and the iſlands of Japan.

Diemen's, or *Van Diemen's Land*, an iſland in the form of an oblong ſquare, about 160 Britiſh miles long, by half that breadth, ſeparated, by a ſtrait, or rather channel, more than 30 leagues wide, called, in recent maps, Baſs's ſtrait, and containing a chain of ſmall iſlands, running N. and S., from New Holland, ſo called by Taſman, in honour of the Dutch governor-general in the Eaſt Indies, who diſcovered it in November 1642. From that time, ſays capt. Cook, it had eſcaped all farther notice by European navigators, till captain Furneaux touched at it in March 1773; but he did not know at that time that capt. Marion, after having remained here for ſome time, ſailed from thence on the 10th of March 1772. It was again viſited by captain Cook in January 1777. The land is, for the moſt part, of a good height, diverſified with hills and vallies, and every where of a greeniſh hue. It is well wooded, and, if one may judge from appearance, ſays captain Cook, and from what we met with in Adventure bay, is not ill ſupplied with water. The beſt is a rivulet, which is one of ſeveral that fall into a pond, that lies behind the beach at the head of the bay. Fire-wood is to be obtained, with great eaſe, in ſeveral places. The only wind to which this bay is expoſed is the north-eaſt, which, blowing from Maria's iſlands, can bring no very great ſea along with it; and, therefore, this may be accounted a very ſafe road. The bottom is clean, good-holding ground; and the depth of water from twelve to five and four fathoms. The author has annexed a chart, which gives a better idea of this part of the coaſt than any deſcription. The following table will exhibit both the longitude and latitude at one view:

	Lat. S.	Long. E.
Adventure bay	43° 21′ 20″	147° 29′ 0″
Taſman's head	43 33 0	147 28 0
South cape	43 42 0	146 56 0
South-weſt cape	43 37 0	146 7 0
Swilly iſle	43 55 0	147 6 0

Adventure bay	Variation of the compaſs	5° 15′ E.
	Dip. of the ſouth end of the needle	70 $15\frac{1}{2}$

The high water was, on the 29th of January, two days before the laſt quarter of the moon, at nine in the morning: the perpendicular riſe was then 18 inches; and there was no appearance of its ever having exceeded $2\frac{1}{2}$ feet. The beautiful ſandy beach, at the bottom of Adventure bay, is about two miles long, and excellently adapted for hauling a ſeine,

a feine; which was repeatedly done with fuccefs. The parts of the country adjoining the bay are quite hilly; and both thefe and the plain behind the beach, in which is a brackifh lake, are an entire foreft of very tall trees, rendered almoft impaffable by fhrubs, brakes of ferns, and fallen trees; except on the fides of hills, where the trees are thinly fcattered, and intermixed with coarfe grafs. The foil on the low land, to the northward of the bay, is either fandy, confifting of a white fand-ftone, which forms the Fluted cape, and bounds the fhore, or confifts of a mould that is yellowifh, or of a reddifh hue. The fame is found on the lower parts of the hills, and farther up, it is of a greyifh caft, and very poor. In the vallies there are fome fmall ftreams; but the country appears to be naturally very dry. The heat alfo is great, as the thermometer ftood at 64, 70, and once at 74 degrees; and birds were obferved to putrefy in an hour or two after they were killed. The country has no minerals, nor, indeed, ftones; and among its vegetable productions none were found that yielded the fmalleft fubfiftence to man. The foreft trees are all of one fort, growing to a great height, and generally ftraight; and they feem to have fome affinity to the *myrtus* of botanifts. There are other fmaller trees, and a variety of plants, which it is needlefs to enumerate. The only quadruped obferved was a fort of opoffum, about twice the fize of a large rat. However, the kanguroo is alfo an inhabitant of this part of the country, as the natives ufed pieces of its fkin in their drefs. Here are feveral forts of birds, which, being much haraffed by the natives, who derive much of their fubfiftence from them, are very fhy. In the woods the principal forts are large brown hawks or eagles, crows, yellowifh parroquets, and large pigeons. On the fhores were gulls and plovers. A few wild ducks were feen about the pond or lake behind the beach, and fome fhags were alfo obferved. Some large blackifh fnakes were feen in the woods, and a lizard, 19 inches long and fix round, elegantly clouded with black and yellow. The fea was well ftocked with various fpecies of fifh; but the elephant fifh, or pejagallo, feemed to be the moft numerous. Upon the rocks the mufcles and other fhell-fifh were plentiful; fea-ftars were numerous; fponge, Medufa's heads, and fea-fuci were not uncommon. Of infects there is a confiderable variety. The inhabitants had little of that fierce or wild appearance, common to people in their fituation; but feemed mild and cheerful, without referve, or jealoufy of ftrangers. They appear to have little genius, or perfonal activity, either of mind or body; their greateft fkill is manifefted in their manner of cutting their arms and bodies in lines of different lengths and directions, which are raifed confiderably above the furface of the fkin, fo that it is difficult to guefs how they execute this embroidery of their perfons. Their colour is a dull black, and not quite fo deep as that of the African negroes. Their hair is perfectly woolly, and it is clotted or divided into fmall parcels, like that of the Hottentots, with fome fort of greafe, mixed with a red paint or ochre, which they fmear in great abundance over their heads. Their nofes, though not flat, are broad and full. The lower part of the face projects confiderably; their eyes are of a middling fize, with the white lefs clear than in ours; and though not remarkably quick or piercing, they gave a frank cheerful caft to the whole countenance. Their teeth are broad, not equal nor well fet; their mouths are rather wide; their beards are long, and clotted, like their hair, with paint. In other refpects they are well proportioned; though the belly is rather projecting. Their habitations are wretched huts, formed of fticks, apparently ferving for a temporary purpofe; but many of their largeft trees were converted into more comfortable dwellings. The trunks of thefe were hollowed out by fire, to the height of fix or feven feet, and in thefe hollows they took up their abode. The inhabitants of this part of the country are fprung, without doubt, from the fame ftock with thofe of the northern parts of New Holland; and the difference may be accounted for by diftance of place, entire feparation, diverfity of climate, and other concurring circumftances. But there is not the leaft refemblance in their language, a circumftance which cannot be eafily accounted for.

The natives approached our navigators, who had landed, without betraying any fymptoms of fear, or rather, with the greateft confidence imaginable. Labillardiere (ubi infra) afcribes the gentlenefs with which they behaved to Capt. Cook and his companions to the dread of European fire-arms, excited by Capt. Marion's being under the neceffity of ufing thefe arms againft them. They were quite naked, and wore no ornaments, if we except the punctures and ridges already mentioned. They received every prefent that was made to them without the leaft appearance of fatisfaction, and they indicated a degree of ftupidity. They feemed to fet no value on iron or on iron tools; and they were even ignorant of the ufe of fifh hooks. Some of them wore, loofe, round their necks, three or four folds of fmall cord made of the fur of fome animal; and others of them had a narrow flip of the kanguroo fkin tied round their ancles. The females wore a kanguroo fkin, juft as it came from the animal, over the fhoulders, and round the waift; but its only ufe feemed to be to fupport their children, when carried on their backs; but it did not cover thofe parts which the inhabitants of moft nations conceal. The bodies of the women were marked with fcars like thofe of the men; but though their hair was of the fame colour and texture, fome of them had their heads completely fhorn or fhaved: others had this operation performed only on one fide, while the reft had the upper part of the head fhorn clofe, leaving a circle of hair all round, fomewhat like the tonfures of the Romifh ecclefiaftics. The women rejected offers of addreffes and prefents with difdain: either from a fenfe of delicacy and virtue, or from a fear of difpleafing their men. That this gallantry was not very agreeable to the latter was certain; becaufe an elderly man, as foon as he obferved it, ordered all the women and children to retire, which they obeyed, though on the part of fome not without reluctance. (Cook's Third Voyage, vol. i.) Of this ifland we have had fome additional information by Mr. Collins, Capt. Flinders, as well as Labillardiere. The fouth-weft cape of Van Diemen's land, according to Mr. Collins, (Account of the Englifh Colony in New South Wales, vol. ii. 1804,) is a narrow piece of land, projecting from the higher land at no great diftance, with two flattifh hummocks, refembling the Ram Head, near Plymouth. The fouth-weft and fouth capes lie nearly eaft and weft of each other, and are diftant about 15 leagues. The intermediate coaft forms the fouthern boundary of Van Diemen's land. The extremity prefents a rugged and determined front to the icy regions of the fouth pole, and like that of Terra del Fuego, feems once to have extended farther fouth than it does at prefent. Its extraordinary elevation and irregular form entitle it to rank among the foremoft of the grand and wildly magnificent fcenes of nature. Lofty ridges of mountains, bounded by tremendous cliffs, project from two to four miles into the fea, at nearly equal diftances from each other, with a breadth varying from two miles to two and a half. The heights or bays lying between them are backed by fandy beaches. Thefe vaft buttreffes appear to be the fouthern extremities of the mountains of Van Diemen's land, which have, very probably, projected into the fea far beyond their prefent abrupt termination, and have been united with the now detached

tached land, De Witt's iſles, ſo named, probably, by Taſman, which are twelve in number, and of various ſizes. The two largeſt are from three to four miles in circuit, with ſteep ſides, but with height inferior to that of the main: the largeſt is the loweſt. Their aſpect, like that of the main, beſpeaks extreme ſterility. After paſſing ſeveral places of ſmaller note, they entered Herdſman's cove; above which they went up the Derwent river in a boat. As they advanced, Mr. Baſs and his companion found the ſtream was 230 yards broad, and three fathoms deep. Here they met with a man, with hair which they did not think to be woolly, armed with two ſpears, very ill made, of ſolid wood. His aſpect was frank and open, and led them to form a favourable opinion of the diſpoſition of the inhabitants of the country in general. From various appearances they concluded, that the natives drew the principal part of their food from the woods; the bones of ſmall animals, ſuch as opoſſums, ſquirrels, kanguroos, rats, and bandicoats, were numerous round their deſerted fire-places, and the two ſpears juſt mentioned were ſimilar to thoſe uſed for hunting in other parts. No canoes were ever ſeen, nor any trees ſo barked as to anſwer the purpoſe of their conſtruction. Upon comparing Van Diemen's land with New South Wales, Mr. Baſs gives the preference, with regard to fertility of ſoil, to the former. Both countries reſemble one another in being amply furniſhed with water for the purpoſes of life; but in being deficient with reſpect to thoſe larger ſtreams, which ſerve to facilitate the operations of man, and convey commerce to the door of almoſt every inland farmer.

Captain Flinders, in his "Obſervations on the Coaſt of Van Diemen's Land, &c. 1801," ſays, that the capes are moſtly baſaltic, and he includes the "Fluted Cape;" the columns being ſometimes ſingle, ſometimes grouped like ſtacks of chimnies. Upon the iſland of "Cape Barren" are found kanguroos, and the new animal, called *womat* by the natives near Port Jackſon, reſembling a little bear. "Furneaux's iſles" are moſtly of a coarſe quartz, and likewiſe "Wilſon's Promontory," in New South Wales; while the general rocks in the laſt are ſoftiſh grit amid iron-ſtone. In general, Van Diemen's land preſents a moſt dreary and inhoſpitable ſhore, mottled with rocks of white quartz and black baſalt. Port Dalrymple is the only harbour upon the north coaſt, which ſeems the moſt fertile.

Labillardiere, in his "Voyage in Search of La Perouſe in 1791—1794," (vol. i.) furniſhes ſome intereſting details with regard to this iſland. He obſerves that, in the month of May, the ſummits of the higheſt mountains were whitened with ſnow; and that theſe mountains form part of a chain, which extends from ſouth-eaſt to north-weſt; whilſt another chain of great extent runs from north-eaſt to ſouth-weſt. In the iſland there are many rivulets and lakes. On the ſide of the mountains was obſerved an horizontal bed of coal, not exceeding in its greateſt thickneſs 3½ feet, but extending for a diſtance of more than 200 fathoms; it reſts on free-ſtone, and is covered with a deep brown ſchiſtus. In theſe rocks were alſo found beautiful pieces of hematite, of a red copper colour, and of tripoli. The foreſts are thick, and not eaſily penetrated; and they conſiſt of many very tall trees, and others of a moderate height, which thrive well notwithſtanding the ſhade of the "eucalyptus globoſus," which is of an enormous ſize. Near the rocky bay, where the French navigators ſtopped, is a lake abounding with pelicans and black ſwans; and on the ſhores are many ſpecies of plants, ſeveral of them being new, which Labillardiere has particularly deſcribed, and of ſome of which he has given drawings. Among the animals are ſeen the kanguroo, which lives in burrows like the rabbit; the ſea-calf of the ſpecies called "phoca monachus;" a new ſpecies of parroquet, repreſented and deſcribed by our author under the name of the parroquet of Cape Diemen: another of "merops," deſcribed by White. Labillardiere's account of the inhabitants is very ſimilar to that of Capt. Cook. They did not flee at the approach of the French, and appeared to be mild and affable. The men and women were equally naked, or covered with a kanguroo ſkin. Their hair is woolly, and they let their beard grow; the upper jaw of children projects conſiderably over the lower, but falls back with increaſe of age, ſo that in adults it is in the ſame line: their ſkin is not very dark; but to increaſe its blackneſs, they cover themſelves with charcoal duſt, principally the upper parts of the body. They eat muſcles, oyſters, the large lobſter, and crabs which they broil: the women are chiefly employed in procuring food and preparing it. They do not appear to have any chiefs: each family ſeems to live in complete independence; but the children are very ſubordinate to their parents; and the women are ſo to their huſbands. They all appear unacquainted with the bow. Thoſe of Adventure Bay have their body tattooed, and their hair powdered with oker. Their domeſtic utenſils afford but an unfavourable ſpecimen of their ſkill and induſtry. There are baſkets clumſily conſtructed of the reed called *juncus acutus*, and drinking veſſels made of a large piece of *fucus palmatus*, cut into a circular form, and moulded into the ſhape of a purſe. They underſtand the art of procuring fire by ſtriking two pieces of flint together, in which reſpect they differ from the other inhabitants of the South Sea iſlands, and even ſome of thoſe of the more eaſterly part of New Holland; whence our author inclines to believe that they are deſcended from a different origin. Their thinly ſcattered huts indicated a very ſcanty population; and the heaps of ſhells found near the ſea-ſhore ſhewed that theſe ſavages derive their principal means of ſubſiſtence from the ſhell fiſh which they find there. One of theſe navigators found ſome human bones among the aſhes of a fire made by the natives. Several bones of the pelvis he diſcovered by their form to have been part of the ſkeleton of a young woman: ſome of them were ſtill covered with pieces of broiled fleſh. Our author, however, is ſcrupulous of ranking the natives of this country with the cannibals: he rather ſuppoſes that they have the cuſtom of burning the bodies of their dead. As theſe were the only human bones diſcovered in this country, and theſe partly burnt, it appears that they do not expoſe the bodies of their dead to the open air. If it be not their cuſtom to burn their dead, they may poſſibly bury them in the earth, or throw them into the ſea.

As there is another Van Diemen's land, Mr. Pinkerton very properly ſuggeſts, that the above deſcribed land, which is one of the iſles of New Zealand, ſhould be called *Taſmania*, in honour of the diſcoverer: and thus the confuſion ariſing from a duplicate of names would be prevented.

Diemen's *Land*, the northern part of New Holland, diſcovered by a Dutch navigator, named Zeachen, who beſtowed upon it this appellation in honour of Anthony Van Diemen, governor-general in the Eaſt Indies, who returned to Europe with incredible treaſures in 1631. We may conclude that this governor encouraged ſuch diſcoveries, as his name was impoſed upon various regions in this part of the world. See New Holland.

DIEMERBROECK, Isbrand, De, in *Biography*, was born at Montfort, in the neighbourhood of Utrecht, in the year 1609. After taking his degree of doctor in medicine at Angers, he went to Nimeguen in 1636, and continued there, through that and the following years, freely attending the inhabitants who were afflicted with the plague, which raged with

with great violence, during that time. It was here that he collected obfervations on the nature and treatment of that difeafe, which he publifhed in the year 1644, in 4to. at Amfterdam. As he followed the method, pretty generally adopted in all fevers, of keeping the patients, in warm, clofe apartments, and gave them mithridate, and other heating medicines, called Alexipharmics, it may be fuppofed his fuccefs was not remarkably great. The book, however, obtained great credit, and has paffed through many editions. In 1642 he went to Utrecht, and was made profeffor extraordinary in medicine. His lectures in medicine, and in anatomy, procured him great credit, and were no lefs ufeful to the univerfity, drawing thither a great conflux of pupils. In 1651, he was made ordinary profeffor, he was alfo twice appointed rector of the univerfity, and continued in high efteem to the time of his death, which happened Nov. 17, 1674. In 1649 he publifhed "Oratio de reducenda ad Medicinam Chirurgia," and in 1664, "Difputationum practicarum, pars prima et fecunda, de morbis Capitis et Thoracis," 12mo. in which, Haller fays, there are fome curious and ufeful obfervations. His "Anatome Corporis Humani," which has paffed through numerous editions, was firft publifhed in 1672, 4to. It is a compilation, but is interfperfed with fome original obfervations. The plates are principally from Vefalius, and neither very elegant, nor very correct. In 1685, his works were collected and publifhed together, under the title of "Opera Omnia," by his fon Timanis de Diemerbroeck, in folio. This was reprinted in two volumes, 4to. and publifhed at Geneva in 1687. It contains, befides the works above-named, "A Treatife on the Meafles and Small-pox, a Century of Obfervations in Medicine and Surgery, and a Third Part of Difputations containing Accounts of Difeafes of the lower Belly." Boerhaave Methodus Studii Med. Eloy. Dict. Hift.

DIEMERIS, in the *Ancient Mufic*, a word ufed fometimes alone, and fometimes joined with the word phorbeia. It expreffed a fort of bandage, ufed by the ancients, to tie up the lower lip in playing on the pipe. The other kind of phorbeia confifted only of one perpendicular piece, which went down the cheek, and one tranfverfe one, which covered the whole mouth, but had a hole cut into it to admit the mouth-piece of the pipe See PHORBÆA.

DIENNE, in *Geography*, a fmall town of France, in the department of the Cantal; 15 miles N. of St. Flour.

DIENSES, in *Ancient Geography*, a people of Gallia Narbonnenfis, placed in the vicinity of the Rhone.

DIENSIS COLONIA, a Roman colony in Pieria, a country of Macedonia. Ptolemy calls it *Dion*.

DIENVILLE, in *Geography*, a fmall town of France, in the department of the Aube; 9 miles N.W. of Bar-fur-Aube.

DJEOUABYS, a hofpitable tribe of Arabs, compofed of about 2000 men, and poffeffing about 60 horfes, who lead a fhepherd's life, and encamp every winter on the banks of the Natron lake in Egypt with their flocks. During this time they are employed in carrying natron and prickly reeds; they have alfo fome traffic in dates, which they fetch in caravans from Sioua in the Ammonian Oafis, which is a journey of 12 to 15 days. Thefe Arabs are "marabouths," or peaceful people, who wander here and there to find water and pafture for their cattle. They never make war; and only take up arms for felf-defence, and this they rarely do; they almoft always trade for money. They retain more than any other tribe their ancient cuftoms; they are merely fhepherds, and refufe to cultivate the foil. Their manners are mild and fimple; though they are fubject to the occafional turbulence of paffion, particularly that of love, clofely allied to jealoufy in the eaft, and fometimes hurrying them into the moft cruel exceffes. The cloathing of the Djeouabys, confifts of an *ibbram* and a *bernous*, a kind of cloak, fimilar to the furplice of thofe who officiate in the Romifh church, made of white wool. This ftuff, which is ufed for the cloathing both of the men and the women, is manufactured in Barbary, and it is bought at Cairo, but chiefly at Alexandria. The wealth of the Djeouabys, and of the Arabs of the defert in general, confifts in camels and fheep, whilft that of the Arabs who dwell in villages, confifts in large cattle. The Arabs always carry with them a great part of their wealth, in order to furnifh their habitable camps. They preferve their chopped ftraw and their grain in large pits under-ground. The neighbourhood of a well of frefh water, a few flips of land of a fcanty product, or falt lakes that can be wrought with fome profit, determine thefe encampments. They poffefs befides, at four or five leagues from the margin of cultivated countries, ftorehoufes kept fecure, and further on in the defert depofits under the fand, known by fome outward marks to the proprietors only. The Djeouabys, in order to prevent being pillaged by the wandering tribes, are obliged to receive them into their camps, and furnifh them with provifions, and barley for their horfes. The Arabs of the defert are of a very different difpofition and character: they are a lawlefs predatory race, and are commonly confidered merely as robbers and affaffins. The principal weapon of the Arabs is a pike, which they throw and wield with great dexterity. They manage their horfes with equal fkill; but they never attack in line, but always like foragers, uttering at the fame time loud cries and invectives; their ftyle of fighting being merely that of light troops. They are in general but ill equipped; their fire-arms and powder are very bad; their balls are not well caft; the powder is granulated in an inartificial manner, and is for the moft part charcoal; which they carry in a wooden flafk, and the balls feparately in a leathern bag, feldom charging their pieces with cartouches. As foon as the Arabs are apprehenfive of an attack, they feparate into feveral fmall camps at a great diftance from each other, and tie their camels to the tents, fo as to be able to move off at a moment's notice. When one tribe is engaged with another, the women come within fight of the combatants, playing on the tambourine, and finging ftrains to excite their courage; the wounded are taken care of by their wives and miftreffes. The women hold valour in great eftimation, and a chief covered with fcars is the boaft of the whole tribe; thus the fupport of empires is the bond of union among thefe miferable hordes of robbers. See BEDOUEENS.

DIEP BAY, a bay in the ifland of St. Chriftopher, near Diep-bay town.

DIEP-BAY *Town*, or *Deep town*, a town on the north-weftern coaft of the ifland of St. Chriftopher. N. lat. 17° 30′. W. lon. 62° 43′.

DIEPBOURG, or DIEBURG, a fmall town of Germany, in the circle of the Lower Rhine, formerly in the electorate of Mayence, but fince the peace of Luneville in the grand duchy of Heffe Darmftadt, one of the confederated ftates of the Rhine.

DIEPENAU, a town of Germany, in the circle of Weftphalia and county of Hoya; 21 miles S.S.W. of Hoya.

DIEPENBEKE, ABRAHAM VAN, in *Biography*, a painter and engraver, was born at Bois-le Duc, in 1607, and was at firft a painter on glafs, in which he excelled his contemporaries; but, difcouraged by a variety of accidents, he directed his attention to painting in oil. He refided for fome time in Italy, and became the fcholar of Rubens, under whom he made great improvement. His invention was fer-

tile,

tile, and his execution spirited; and if he had taken time to correct his first ideas, he would have produced works that might have given him rank among the first artists; but being much employed in making drawings for prints and books of prints, he hurried his compositions, without attending to the propriety of his choice. He is said, however, to have imitated Rubens with success; he coloured well, and gave great force to his paintings by his singular skill in the chiaro scuro. He engraved several "devotional subjects" with great success. Strutt and Pilkington.

DIEPHOLD, or rather DIEPHOLZ, in *Geography*, a small town of Germany, in the circle of Westphalia, situated on the lake Dummer, (which see) 30 miles S. of Bremen, 36 N.W. of Minden, and 30 N.E. of Osnabruck. Lat. 52° 45'. It is the chief place of a county of the same name, formerly in the electorate of Hanover, but now in the conscription of the new kingdom of Westphalia.

DIEPPE, a considerable sea-port town of France, in the department of the Lower Seine, chief place of a district of the same name, situated near the English channel, at the mouth of the river Béthune, 138 miles N.W. of Paris, and 42 miles N. of Rouen. E. long. 1° 12'. N. lat. 49° 55' 17". It is a handsome well-built town; the streets are straight and spacious, particularly the high street, (la grande rue) which runs all the length of the place, and is nearly a mile long. The church of St. James is a fine building. There are two suburbs, that which is called Le Paulet is chiefly inhabited by sailors and fishermen. At the western extremity of the town is an old, but irregularly and badly fortified castle; at the east end is the harbour, in the shape of a semicircle, with two very fine moles of strong brick-work.

Dieppe is one of the eleven quarters of the maritime district of Havre, and comprizes in its naval conscription the lesser ports of Berneval, Criel, and Le Tréport. As it is the nearest sea-port town to Paris, it supplies that capital with fish by means of light carts, called chasse marées, which travel night and day. Its principal fisheries are, those of the herring, whiting, and mackarel. The number of vessels engaged in the herring fishery amounts, in times of peace, to 60 or 70, the average produce of which is from 84 to 120,000 barrels, worth from two to two millions and a half French livres. The barrel of salt herrings is generally sold at 21 livres, fresh at 20, and red herrings at 16½ livres. During the short interval of peace from 1801 to 1803 the annual produce was not more than 40,000 barrels. The whiting fishery lasts during the months of December, January, and February, and is chiefly for the Paris market. The average produce of the mackarel fishery is 280,000 livres. It employs from 40 to 50 vessels.

In time of peace there are regular packet-boats between Dieppe and Brighton. The passage is only 66 English miles, and takes from 10 to 24 hours. The distance from London to Paris, by Brighton and Dieppe, is 87 English miles shorter than by Dover and Calais.

Next to the fisheries, the most important trade at Dieppe is its thread lace manufacture; which, in 1788, occupied about 4000 married and unmarried females and children, chiefly fishermen's daughters and wives. Its annual produce was estimated at 400,000 livres. The merchants sell the thread to the women, and pay them for the lace according to its value, which differs from seven-pence halfpenny a yard (aune) to fifteen and sixteen shillings sterling a yard. They use chiefly Flemish thread from St. Amand. Common lace consumes more thread than the fine bone lace. A yard of fifteen-penny lace holds nine-pennyworth of thread, whilst a yard of seven or eight shilling lace holds only about three-pennyworth of thread. The inferior workwomen earn but from three-pence to four-pence a day; the best from six-pence to eight-pence, and even a shilling a day.

The manufacture of ivory and bone toys, of excellent workmanship, and at uncommonly reasonable prices, occupies several hundred hands at Dieppe. Its population amounts to 20,000 individuals. The territorial extent of the canton is 12 kiliometres and a half; it includes only two communes, and reckons, altogether, 20,500 inhabitants.

As chief place of a district Dieppe has a sub-prefect, a court of justice, a tribunal of commerce, and a register office. The soil of the district is very fertile, and produces all sorts of corn, vegetables, fruits, hemp, and flax, but chiefly a plant called vetch, (la vesce) which is considered as an excellent fodder for cattle.

The district of Dieppe comprizes, upon a territorial extent of 1237½ kiliometres, eight cantons, 222 communes, and 106,082 inhabitants. Herbin. Statistique de la France.

DIEPPENHEIM, a town of Overyssel; 20 miles E. of Deventer.

DIER. See DYER.

DIERNA, in *Ancient Geography*, a town of Dacia. Ptolemy.

DIERDORF, in *Geography*, a town of Germany, in the circle of Westphalia, and county of Wied Runkel, seated on the Wiedbach, with a castle, the residence of the counts. The inhabitants are industrious, and employed in agriculture and commerce; eight miles N.N.E. of Coblentz.

DIERNBACH, a town of Germany, in the archduchy of Austria; 11 miles S. of Steyr.

DIERNBERG, a town of Germany, in the duchy of Stiria; six miles N. of Nitterfeldt.

DIERNPACH, a town of Germany, in the archduchy of Austria, five miles E. of Miessau.

DIERNSTEIN, or TYRNSTEIN, a small town of Austria, in that part which is called Lower Austria, or the country below the Ens, in the circle above the Manhartsberge (circulus supra montem Meinhardi.) It is situated near the Danube, and famous for being the place where king Richard was discovered and confined, in 1194, by Leopold; and where a division of the French army, of but 5,000 men, commanded by general Gazan, fought their way through 20,000 Russians in the year 1805.

DIERVILLA, in *Botany*. See LONICERA.

DIES. See DAY.

DIES, in *Common Law*. There are two kinds of days, *juridici*, & *non juridici*.

DIES *juridici*, or *fasti*, are all days wherein justice is administered in court.

DIES *non juridici*, or *nefasti*, are all Sundays in the year: and in Easter term, the feast of the Ascension of our Lord: in Trinity term, the Nativity of St. John the Baptist: in Michaelmas term, the feast of All Saints, and All Souls: and in Hilary term, the Purification of the Blessed Virgin.

The same distinction holds not only as to legal proceedings in court, &c. but also as to contracts.

DIES, in some *Ancient Authors*, is also used for daily provision. "Et reddebat dimidium diem mellis, *q. d.* as much honey as served the king's family half a day."

DIES *datus*, is a day, or time of respite given to the tenant, or defendant, by the court.

DIES *Marchiæ*, was a day of congress, or meeting of the English and Scots, appointed annually to be held on the marches or borders, to adjust all differences between them, and preserve the articles of peace.

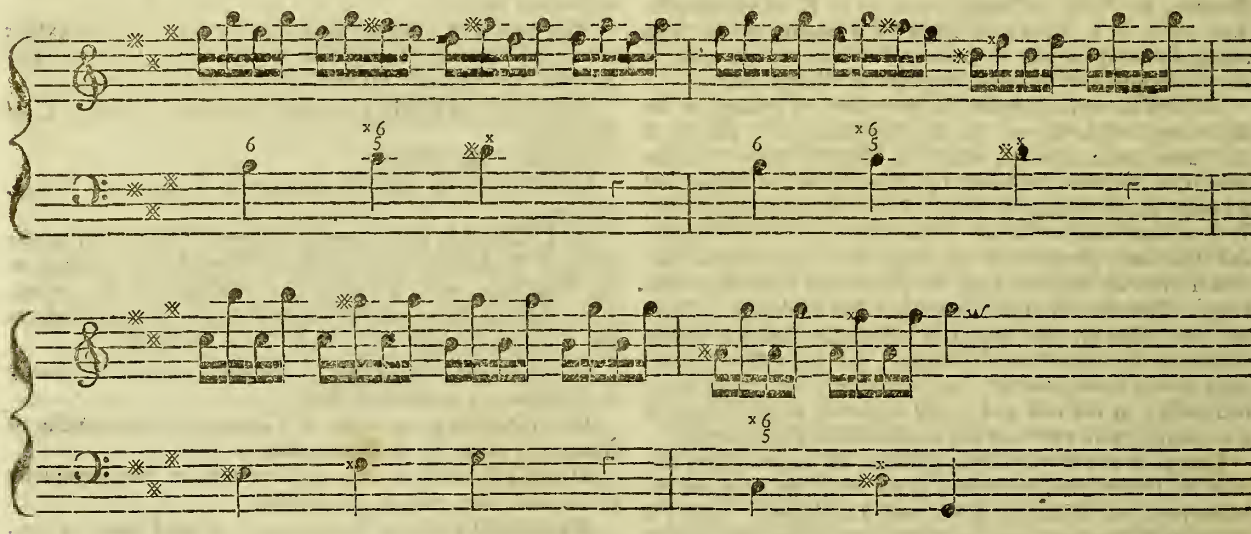
DIESBACH, in *Geography*, a small town of Switzerland, in the canton of Berne, remarkable for its excellent manufactures

manufactures of coarfe and fine woollen cloth and linen cloth of a fuperior quality.

DIESIS, in the *Ancient Mufic*, was the enharmonic fharp, × ; in the modern Italian mufic it implies a common ※ or minor femitone. See SHARP and ENHARMONIC. The order in which the fharps are placed at the clef is by fifths, in the following manner : F C G D A, &c. The ufe of a ♭ and ※ in the middle of a movement extends no further than a fingle bar, unlefs the laft note of a bar is fharp, and is repeated or continued by the firft note of the next bar; then the fharp of the firft bar need not be repeated, but is underftood, unlefs contradicted by a ♮ . Flats and fharps at the clef are to regulate the femitones of tranfpofed keys. In major keys, afcending, the femitones are from the third to the fourth and from the feventh to the eighth, and in minor keys, defcending, without accidental fharps, or flats, they lie from the fixth to the fifth and third to the fecond.

The French and Italians have no other word to exprefs a ※, or minor femitone, than *dieze* and *diefis*.

The enharmonic fharp, or quarter-tone, in the Greek mufic marked with a fingle crofs × , is ufed in modern mufic for a double fharp ; as in a key with many fharps at the clef, if it is neceffary to elevate one of the founds already fharp a nominal half note, it is (or fhould be) expreffed by an enharmonic di fis, thus : as in Corelli's XIth folo.



The diefis, or common fharp, is inadmiffible in canto fermo. P. Martini.

DIESIS *Enharmonic*, in *Mufic*, is an interval fo named by Rameau, Overend, &c. whofe ratio is $\frac{125}{128}$, and its common logarithm .9897000,4336. It is alfo the dieze major of Rameau ; the harmonia of Henfling ; the apotome major of Saloman de Caus, Boetius, &c. ; the minor enharmonic quarter tone of fome ; the quarter note or quarter tone of Dr. Boyce and others ; the tierce wolf of earl Stanhope, and the comma greater of fome. It is equal to $21\,\Sigma + 2\,m$, $=$ 1.909170 times the major comma. In Euler's logarithms, or decimals of an octave, it is $=$ .0342157. It refults from the addition of the following intervals, *viz.* a major comma and a minor comma ; a fchifma and two minor commas ; and a major refidual and an hyperoche. This interval will alfo be found as the difference of the following intervals ; *viz.* a major comma from a femitone minimum ; a femitone minor from a femitone major ; a femitone fubminimis from a limma ; a femitone medius from a femitone maximum ; an hyperoche from a femitone minor ; two femitones minor from a minor tone ; a fchifma from two minor commas ; a minor tone from two major femitones ; three fchifmas from two diafchifmas ; three major thirds from an octave ; and three minor fixths from two octaves ; alfo two major thirds from the fum of a minor fourth and minor third. The three laft furnifhing us with practical methods of tuning an enharmonic diefis upon an organ, &c.

DIESIS *Major* of Maxwell ; this interval has a ratio of $\frac{2025}{2048}$, $= 10\,\Sigma + m$; and is the *minor* COMMA, which fee.

DIESIS *Minor* of Maxwell ; this interval has the ratio of $\frac{32768}{32805}$, $= \Sigma$, and is the SCHISMA, which fee.

DIESIS *Major* of lord Brouncker ; the ratio of this interval is $\frac{24}{25}$, $= 36\,\Sigma + f + 3\,m$, being the *Minor* SEMITONE, which fee.

DIESIS *Chromatic* ; this interval has a ratio of $\frac{16,384}{16,875}$, $= 26\,\Sigma + f + 2\,m$, its common logarithm is .9871761,5779. It refults from the addition of the following intervals ; *viz.* a fchifma, and femitone fubminimis ; and the major comma, and hyperoche ; alfo, as the difference of the following, *viz.* an enharmonic diefis from a medius femitone ; a minor comma from a minor femitone ; a major refidual from a femitone minimum ; two minor commas from a limma ; two enharmonic diefes from a femitone maximum ; and three minor fourths from four major thirds, the laft furnifhing a method of tuning a chromatic diefis on an organ, &c.

DIESIS of Dr. Smith. This author, in his Harmonics, has confidered various tempered fyftems, whofe feveral octaves he makes to confift of five equal tones, and two equal limmas ; in each of which he calls the difference between the tone and limma the minor limma of that fyftem ; and he alfo denominates the difference between the major and minor limma the diefis of each fyftem ; for example, (page 223) he calculates the diefis, in his fyftem of equal harmony, to be in common logarithms $=$ .9879016,993.

DIESIS *quadrantalis* of Euclid, is the $\frac{1}{10}$th part of the minor fourth, or $25\frac{2}{5}\,\Sigma + \frac{1}{2}f + 2\frac{1}{5}\,m$.

DIESIS *trientalis* of Euclid, is the $\frac{2}{15}$th part of the minor fourth, $33\,\frac{12}{15}\,\Sigma + \frac{2}{3}f + 2\frac{14}{15}\,m$.

DIESIS of Boethius, is half of the limma, or $23\,\Sigma + \frac{1}{2} + 2\,m$.

DIESIS of Mercator, is ftated to be $\frac{2}{53}$d part of an octave, or $23\,\frac{5}{53}\,\Sigma + \frac{24}{53}f + m$.

Diesis *quadrantal* of Ariftoxenus, is the ¼th part of a major tone, or $26\,\Sigma + \frac{1}{2} f + 2\frac{1}{4} m$.

Diesis *triental* of Ariftoxenus, is the ⅓d part of the major tone, or $34\frac{2}{3}\,\Sigma + \frac{2}{3} f + 3\ m$.

Diesis of Martianus Capella, is an interval very nearly equal to $7\frac{1}{2}\,\Sigma + \frac{2}{3} m$; of which he ftates, that 38 of them, and 19 femitones minor, make up a major twelfth; and alfo, that 34 of them, and 17 femitones minor, make up the minor eleventh.

DIESPITER, in *Antiquity*, a name given to Jupiter.

Some authors will have it the fame with *Dios Pater*, Jupiter father; Jupiter being called in Greek Ζεὺς, or Δεὺς, whence the oblique cafe Διὸς, &c. Others hold Diefpiter to fignify *Diei pater*, father of the day. St. Auguftin derives the name from *dies*, day, and *partus*, production, bringing forth; it being Jupiter that brings forth the day. Of which fentiment were Servius and Macrobius; the former adding, that in the language of the Ofci they called him *Lucentius*, as Diefpiter in Latin.

Struvius, Antiq. Rom. Synt. C. I. feems to intimate, that Diefpiter fignified Pluto; but, if that be his meaning, he is apparently miftaken. For both in Cicero, and in the infcription, he quotes from Gruter, xxi. 8. we have only *Dis pater*, and not Diefpiter.

DIESSE, or Tessenberg, in *Geography*, a beautiful high valley of Switzerland, in the canton of Berne, about eight miles long, and fix broad, containing two parifhes in the clerical jurifdiction of Nidau. The inhabitants fpeak French, and are of the Proteftant religion.

DIESSENHOFEN, an ancient town of Switzerland, in the canton of Thurgau, fituated on the Rhine. Its ftreets are regular and fpacious, and it has feveral very fine buildings, but only one church, in which the Proteftants and Roman Catholics alternately perform divine fervice. Hartman, count of Kybourg, is fuppofed to have founded this place, or at leaft walled it in, about the year 1178. From him it devolved to the counts of Habfburg, and was taken from the houfe of Auftria by the Swifs in 1460.

DIESSENSTEIN, a town and caftle of Germany, in the circle of Bavaria; 12 miles N. of Paffau.

DIEST, Adrian Van, in *Biography*, a painter and engraver, was born at the Hague in 1655, but refided chiefly in England, where he painted landfcapes with great fuccefs; forming his tafte for this fpecies of painting, from a contemplation of the fcenes which he furveyed along the coafts, in the weftern parts of this kingdom. If this artift had met with encouragement adequate to his genius, he would probably have arrived at a fuperior degree of excellence; but being obliged to paint pictures at low prices, he had not leifure to beftow upon them fufficient ftudy; and, therefore, his works are very unequal. Some of his pictures, finifhed in his beft manner, poffefs great clearnefs and tranfparence in the colouring, and a peculiar tendernefs in the diftances; in the fkies they are truly fine, in the clouds they have an uncommon freedom, and through the whole they are diftinguifhed by an agreeable harmony. This mafter has etched in a flight, but mafterly ftyle, feveral fets of fmall landfcapes. He died in 1704. Pilkington and Strutt.

Diest, in *Geography*, a town of France, in the department of the Dyle, chief place of a canton in the diftrict of Louvain, fituated on the river Demer, three miles E. of Montaigu, and 14 N. of Tirlemont. N. lat. 50° 59′. It has fome manufactures of woollen cloth and worfted ftockings. Its population amounts to 5053 individuals. The canton contains 13 communes, and 13,883 inhabitants, upon a territorial extent of 215 kiliometres.

DIET, Δίαιτα, *diæta*, in *Medicine*, the regimen in refpect to food and drink, adopted more particularly with a view to the prevention and cure of difeafes.

The importance of a proper regulation of the diet in preferving the health, even of the moft robuft, cannot for a moment be queftioned; but it would appear that both phyficians, in their theoretical difquifitions on this fubject, and mankind, in their practical application of the refults, have fallen into frequent errors, but of a different nature. Phyficians have often difcuffed the modifications of diet, both in health and difeafe, with too many minute and fubtle diftinctions as to the wholefomenefs of individual articles, and with too rigid an application of their general rules. And men, on the other hand, confidering only the general notion of the falutary nature of this or that fubftance, have forgotten that the regulation of the quantity is not lefs important than caution as to the quality of their food. As to the quality of our diet, indeed, an over-anxious obfervation of rules and precepts is to be deprecated; it has frequently been the occafion of injury to the healthy, as Dr. Heberden has juftly remarked, and has not feldom augmented the indifpofition of the fick. Cuftom and experience have long fince taught mankind what food and what regimen are ufeful and wholefome to the generality of men; and among thofe matters, which are generally wholefome, no particular article is to be avoided; unlefs individual experience has pointed out fome peculiar conftitutional difpofition to be affected by particular fubftances. For, in other refpects, thofe who are not deficient in common judgment, will readily afcertain what forms and modes are more congenial with their individual conftitution.

If we look into the hiftory of mankind, inhabiting the different parts of the globe, fo far as we are acquainted with it, we fhall find that different nations fubfift on kinds of diet very different from each other, yet all enjoy a degree of health, which renders them competent to their duties in life in the countries which they inhabit. A great part of the eaftern world is principally fubfifted by rice and vegetables; the inhabitants of many countries live upon fifh; others on a mixed diet, partly animal, partly vegetable. Some have no fermented liquors; others ufe thefe only. Yet all, compared with each other in the fame community, are healthy. The author of nature has fo conftructed us and our organs of digeftion, that we can gradually accommodate ourfelves to every fpecies of aliment; to live on rice, on vegetables, on animal food folely, or mixed with vegetables, without fuffering injury. Nay, we can fubfift on every variety of thefe fubftances, under every mode of preparation, preferved in falt, hardened in fmoke, pickled with vegetable acids, &c. as is exemplified in different countries, and in different feafons of the year. In a word, no *kind* of food injures us; we are capable of being habituated to every fpecies, and of converting into nutriment almoft every production of nature. It is obvious, therefore, that in a ftate of health, the confideration of the quality of our victuals is of lefs importance than it has frequently been deemed. We are often afked, fays Dr. Fothergill, what our opinion is refpecting certain articles of food, as to their being more or lefs wholefome. "Perhaps the moft pertinent anfwer in common would be, that which is reported of the late Dr. Mandeville, of famous memory, who being often the convivial gueft, I think it was of one of the firft earls of Macclesfield, was frequently interrogated on the fubject of diet. Doctor, is this wholefome? Does your lordfhip like it? Yes. Does it agree with your lordfhip? Yes. Why then it is wholefome." See Medical Obfervations and Inquiries, vol. vi. p. 119.

But, even to the healthy, an attention to *quantity* is by no means unimportant. There are many people, indeed, who feem to be poffeffed of fuch powers of digeftion, as to be

under no reftraints on that account, and who feldom feel themfelves incommoded, either with the quantity or with the moft heterogeneous qualities of their food. They rife from the moft plentiful, mixed, and rich repafts, without any kind of apparent uneafinefs. But even the robuft are not perfectly fecure from the dangerous effects of a full meal. "Apoplexies," fays the experienced phyfician juft quoted, "proceed, perhaps, more frequently from this caufe, than all the reft put together." Of this remark, indeed, our newfpapers afford abundant corroboration; fince nothing is more common than accounts of the fudden death of individuals, "who appeared to be in perfect health, and had juft eaten a hearty dinner," or "who had gone to bed in apparent good health, after having enjoyed a hearty fupper," and fo forth. It has been thought, fays Dr. Fothergill, that more people fuffered by hard drinking than immoderate eating. My obfervation leads me to take the oppofite fide. At prefent, indeed, the former practice is generally banifhed to the vulgar, but whilft it prevailed to the utmoft, it feems to me that more were injured by excefs of diet than of drinking. *Loc. Cit.*

"The firft phyficians by debauch were made,
Excefs began, and floth fuftains the trade."

In fact, it is a doctrine, however trite and familiar, which cannot be too ftrongly inculcated; as a neglect of this attention to the *quantity* of the food, proportioned to the neceffity of each individual, is fooner or later followed with the moft ferious confequences. To the ftrong and robuft inflammatory difeafes happen, and all fuch as proceed from plenitude, as the gout, apoplexy, palfy, lethargy, and a variety of chronic indifpofitions. To the more tender and delicate, it is the parent of a numerous progeny of diftempers, affecting both body and mind; there is fcarcely a malady that can be named, which either does not originate from this neglect of diet, or is not increafed by it, till the difeafe at length bids defiance even to temperance itfelf, and all prefcription. The *how much*, indeed, muft be determined by every individual; but thofe who are happy enough to abftain at the firft fenfation of fatiety, have made great progrefs in the art of maintaining fuch a command of appetite, as, under moft chronic indifpofitions, is one of the greateft aids of recovery; and, in health, is one of the fureft prefervatives againft them.

To the delicate and valetudinary the confideration of the quantity of the food is of ftill more importance. They do not rife from rich and varied repafts with the fame freedom from uneafy fenfations, as the robuft; they are affected with uneafinefs, fome in one way, fome in another, by the unnatural load. And we often hear them complaining of the ill effects of this or of that particular kind of diet, when, perhaps, their fufferings arife from the quantity of all, rather than from the difagreement of any.

What renders an attention to the quantity of food in invalids ftill more neceffary, is, that they are often fubject to a falfe appetite; to a craving that does not arife from the demands of health, but from the morbid condition of the juices in the ftomach, which prompts them to eat more, and more frequently than nature requires. Whence it happens that fuch people are often difpofed to take in much more than can be digefted, to devour their food rather than eat it; by which means their fufferings are increafed, the difeafe gains ground, defeats every purpofe of the phyfician, and leads them into fome permanent and incurable malady. And fhould the patients have admitted an opinion, (and fuch an opinion occurs but too often) that their recovery will be aided by taking in a greater fhare of food, their misfortune is complete. Thefe are not ideal traits in the hiftory of the fick; they are known to be but too true by every phyfician of obfervation; and they cannot be mentioned too often, or with too much fervency, for the fake of thofe who are liable to become the victims of appetite or inattention. Early habits of felf-command are of the utmoft benefit to all; and even thofe who feel no immediate diftrefs from the utmoft repletion at prefent, would find it their intereft to be moderate and difcreet. Fothergill.

The cuftom of countries, in refpect to meals, are different. Breakfaft, dinner, and fupper, in this country, have been habitual. Suppers, at prefent, are difcouraged among the affluent; and exceffive ones, fuch as have been in ufe among our anceftors, very probably with good reafon. Or, perhaps, we fhould rather confider the meal of dinner to have been difcarded, and an early fupper fubftituted; a change which, on the whole, is to be confidered as detrimental, at leaft to invalids and perfons of delicate habit. Two very moderate meals, at a fuitable diftance of time, would doubtlefs be digefted with much more eafe than one full meal, when the ftomach has been debilitated by long fafting, and has fuffered fatigue, together with the body at large, from the exertions of a long day. So that, as Dr. Fothergill has obferved, "when people affure us that they eat no fuppers, from obfervation I am led to fufpect, that it would be better for them if they did, than to opprefs nature with a cumbrous load, that may be much more detrimental." This, indeed, feems to be pretty well underftood, with refpect to invalids and convalefcents, who are generally fupplied with fmall light meals, at proper intervals, rather than have all their diet crowded into one late dinner.

The general breakfaft of people, from the higheft to the loweft, is tea, coffee, or chocolate. There are, of courfe, many exceptions; fome for one reafon, fome for others, making choice of other fubftitutes, as their experience or opinions guide them. To thefe articles bread of fome kind, with more or lefs butter and fugar, is commonly joined to make up the meal. From many inconteftible proofs, that butter in confiderable quantities is injurious to conftitutions not ftrong, it is fparingly ufed in many families. It is found by many to be very difficult of digeftion, efpecially when toafted before the fire, or fried, as well as in fauces. Many people, apparently robuft, and whofe organs of digeftion are ftrong, often find themfelves much difordered by large quantities of butter. Nothing more fpeedily and effectually gives the fick head-ache, and fometimes within a very few hours. After breakfaft, if much toaft and butter has been ufed, it begins with a fingular kind of glimmering in the fight, objects fwiftly changing their apparent pofition; giddinefs then comes on, head-ache, and ficknefs. An emetic, and warm water, foon wafh off the offending matter, and remove thefe diforders. Thefe are circumftances which very often happen to people who are inattentive to the quantity of butter they eat at breakfaft. A moderate quantity of frefh butter, with bread expofed as little to the fire as poffible, or not at all, appears to be wholefome, and is capable of becoming with the other aliments, as foft and inoffenfive chyle, perhaps, as any part of our diet.

The fame thing may perhaps be faid of coffee, as of tea; the heat, the ftrength, and the quantity, make it unwholefome or otherwife. There are nations who almoft live upon coffee, as others do on tea; and among neither are any difeafes prevalent, that can juftly be afcribed to thefe ingredients in the common courfe of living. There are, however, individuals of peculiar conftitution, in whom the Indian tea excites various unpleafant fymptoms, as head-ache, reftleffnefs, &c.; and feveral Britifh plants have been recommended

mended as fubftitutes, and ufed with advantage. Such are fage, balm, mint, and the like; the leaves of the different fpecies of rofe-tree, and of the floe-tree, or black thorn, (*prunus fpinofa*, Linn.) are recommended by Dr. Withering, efpecially the latter, the leaves of which, dried, he efteems the beft fubftitute for tea that has yet been tried. Dr. Willich recommends the flowers of the *rofa pimpinellifolia*, of the woodroof, *afperula odorata;* but adds that the firft tender leaves of the whortle-berries, *vaccinium myrtillus*, cannot be diftinguifhed from real tea, when properly gathered, and dried in the fhade. (Lectures on Diet and Regimen, p. 417.) It fhould be recollected, however, that every vegetable infufion of this fort, is but warm water, rendered more palatable by the aroma of the herbs fo infufed; and that there is little or no nutriment conveyed by them to the body, except what is contained in the fmall portion of milk and fugar added to them. Thefe liquors, then, fhould be confidered as the mere beverage, by which the folid portion of the breakfaft, the bread, &c. is to be diluted, and its digeftion affifted: and it would be advifable for the delicate and valetudinary to curtail the liquid, and augment the folid part of a meal, which is to fupport them during the exertions of the day, rather than to fill the ftomach with a diluent and narcotic liquid, at once failing to nourifh the body, and depreffing the action of the ftomach, where little is taken befides.

Chocolate, which is the fruit of a tree growing in the Weft Indies, ground into a pafte, with other ingredients, is in itfelf a nutritious fubftance, and to thofe who like it, and with whom it agrees, it may be confidered as a wholefome breakfaft. The fame may be faid of milk, efpecially of that from which fome of the oleaginous part, the cream, has been taken away, and which has been afterwards boiled. Both thefe matters are fo oleaginous that little or no butter fhould be taken with them.

But the effects of improper conduct in refpect to thofe things which now conftitute our breakfafts, are of little confequence, compared with thofe which arife from the well-covered table at dinner. The indulgences of breakfaft fupply but very few materials for deftruction; but the repeated exceffes at dinner are ferious affairs. And although, as we have before ftated, the quantity of food is the point to be principally regarded; yet the quality is by no means a matter of indifference to the valetudinary.

The principal admonition, which the late Dr. Heberden deemed it neceffary to imprefs on the minds of delicate perfons and invalids, was to avoid all thofe artificial ftimulants of the appetite, which excite the defire for food beyond the fimple call of nature, and, therefore, beyond the natural powers of the ftomach to digeft. Such are all made difhes, and condiments of the more poignant qualities; nor is variety of difhes lefs pernicious, upon the fame principle. (See Heberden Comment. de Morbor. Hift. et Curat. cap. i.) It is probable that, in their nature, aromatic vegetable condiments, or fpices, are lefs pernicious to the organs of digeftion, than the various modifications of alcohol, or fpirits; but the mifchief which they occafion indirectly, by leading to excefs, is unbounded. This excefs is ftill more pernicious, now that the hour of dinner is poftponed to the evening; for the ftomach is enfeebled by the long abfence of ftimulus, and by fympathizing in the fatigue of the body, fo that its power of digefting a copious and heterogeneous mafs is greatly diminifhed; it is loaded, and diftended, and oppreffed; and the body, in its turn, fuffers with the ftomach. Hence, we fee the flufh of the countenance fucceeding to a late and copious dinner; the indifpofition to any active exertion, mental or corporeal; the general oppreffion of the animal powers; the heavinefs to fleep; and the general fenfation of heat; the hurried pulfe; dry or clammy tongue; and other fymptoms of flight feverifhnefs. It is moft obvious, that the daily, or even frequent repetition of fuch a diforder, (for it is, in fact, a morbid condition which is thus produced,) cannot be fuffered, without injury to the conftitution. That this is no imaginary defcription, the feelings of every valetudinary, who thus fubmits to the controul of a pampered appetite, will teftify.

Some of the common articles of diet require a little attention. Bread, the ftaff of life, is not the moft eafy of digeftion; if taken in confiderable quantity, very ftrong organs are requifite to convert it into nutriment, and more efpecially when it is new, or recently baked; for then it is of a glutinous and heavy nature, and extremely difficult of folution. Cafes have been recorded, indeed, in which an immoderate quantity of frefh-baked bread proved the caufe of death. (See London Med. Journal for 1781, vol. i. p. 333.) In weak ftomachs a large proportion of bread is indigeftible; it turns four, produces the heart-burn, flatulencies, and interrupts the perfect concoction of every thing elfe. On this principle, the neceffity of paying much attention to this capital article of diet, ought to be inculcated on valetudinaries in general; never to abftain from it wholly, but to ufe it with moderation; to confider it as one of thofe things which, fparingly ufed, is extremely neceffary and beneficial; if otherwife, the fruitful fource of many complaints, which are little fufpected from this caufe.

In this country, animal food, of one kind or another, conftitutes the chief part of our nourifhment. That there are fome kinds of more eafy, fome of harder digeftion, is well known to every one; fo that it is unneceffary here to particularize them. The young of animals is generally confidered as more eafily foluble than the old; but in ftomachs difpofed to acidity, this does not appear to be the cafe. Animal food is rendered more digeftible, by approaching to a ftate of beginning putrefaction; hence, the flefh of animals recently killed is lefs eafy of digeftion than that which has been kept for fome time; and hence, alfo, the flefh of an animal which has been hunted, or has ufed any violent exertions before death, is more tender and wholefome, than one which has been in confinement; for, after fuch exertions, the mufcular or flefhy parts are difpofed to go fpeedily into a ftate of putrefaction. On the contrary, the regular continued action of the mufcles, during life, hardens them, and renders them more difficult of folution in the ftomach. Thus, the legs of poultry, which are in conftant exertion, are harder than the flefh of the wings, or of the breaft, becaufe thefe mufcles are feldom exerted in flying. There can be no doubt, however, that fcarcely any modification of animal diet would generally difagree, *i. e.* would be digefted with difficulty and uneafinefs, if we were fully as anxious, in refpect to excefs of quantity, as to the unfuitablenefs in kind. If a perfon eats as much of ham, falted beef, or bacon, as he ought to do of fifh or chicken, he may fuffer by it.

Fifh holds a fort of intermediate rank between animal and vegetable matters, as to the quantity of nutriment it contains; it is of itfelf eafy of digeftion, and fits light on a delicate ftomach, provided it is taken without heavy fauces, or preparations of butter.

It is the opinion of fome writers, that animal diet has confiderable influence on the powers of the underftanding, being equally adverfe to the exertions of genius, fentiment, and delicate feelings, as well as to deep mental refearches. Dr. Falconer, after expreffing this opinion refpecting the influence of animal diet, adds, at the fame time, that it may, neverthelefs, be better adapted to the common bufinefs of life,

life, than a diet which produces a greater degree of fenfibility. On the contrary, in proof of the favourable nature of vegetable diet to mental exertion, he quotes the anecdote related by Cheyne of fir Ifaac Newton, who was fo fenfible of the unfavourable operation of animal food, that during the time of writing his treatife on optics, which is generally thought to be the work in which his genius difplayed itfelf in its fulleft force, he lived on a vegetable diet only, and that extremely fimple and rigid. There is, doubtlefs, fome truth in thefe obfervations; but the extreme temperance, and not the vegetable nature of the food, may be confidered as the favourable meafure. We are fatisfied that, after a temperate meal, even of animal food, the mind is foon again adequate to its beft exertions.

In refpect to vegetables, the beft rule is to ufe thofe which beft agree with each particular conftitution. All the vegetables brought to table, which have been rendered foft by boiling, are readily digeftible. The raw vegetables, ufed in fallad, &c., are fomewhat lefs fo; but, except where the ftomach is much difpofed to acefcency, they are generally wholefome. "On this head," fays Dr. Fothergill, "I have only one fhort caution to give. Thofe who think it neceffary to pay any attention to their health at table, fhould take care that the quantity of bread, and of meat, and of puddings, and of greens, fhould not compofe each of them a meal, as if fome were only thrown in to make weight; but carefully to obferve, that the fum of all together do not exceed due bounds, or incroach upon the firft feelings of fatiety."

With refpect to fruit, it is, doubtlefs, wholefome, in its ripe ftate; efpecially, if taken in the forenoon, or inftead of a meal. But, like other agreeable and nutritious fubftances, it muft prove injurious, when added to the load of the ftomach, after a plentiful meal.

Much might be faid about the comparative advantages of the different kinds of liquor ufed at table. The great object of drink at our meals is to dilute the aliment taken into the ftomach, and thus render it more capable of digeftion. It is too often, however, ufed for a very different purpofe; namely, to ftimulate an imperfect appetite, and to enable the ftomach to receive with relifh what, in its unftimulated ftate, it would loath and reject. In as much, then, as drink is conducive to excefs in eating, it is pernicious to take large and frequent draughts of any liquid during the great meal. It will be feen, under the article CORPULENCY, how little liquid is abfolutely required by nature for the healthy digeftion, and how much a free ufe of the mildeft and moft unexceptionable tends to promote corpulency, by promoting gluttony. Dr. Fothergill has laid down a few fimple rules in refpect to drink.

"The leffer quantity of fermented liquors we accuftom ourfelves to the better.

"To abftain from fpirits of every kind, however diluted, as much as may be.

"Where mild, well-brewed beer agrees, to keep to it as a beverage.

"Where water does not difagree to value the privilege, and continue it.

"Like what has been faid of diet in general, fo, likewife, it may be added in refpect to liquors; it is the quantity, in common, that does more harm than the kind; and people, efpecially in the fore part of life, cannot be too folicitous to fhun the firft temptations to the love of fpirituous liquors." Loc. cit.

Thus alfo the nonagenarian Dr. Heberden. "Potui aptiffimæ funt cerevifia tenuis, et aqua pura. Spiritus, qui vocatur vini, et vinum aqua mixtum, cane pejus et angue funt vitanda. Etenim plures cognovi, qui horum ufu fenfim fefe affuefecerunt liquoribus vinolentis, quibus indies meracioribus fumptis brevi omnino carere non potuerunt, donec ex fobriis et fanis facti funt ebriofi et valetudinarii; tam animorum, quam corporum debilitate, graviffimas hujus erroris pœnas luentes." Comment. loc. cit. See DRUNKENNESS.

There is another repaft which, fince the introduction of tea, is become a kind of neceffary of life, and is as much expected in every family as the other ufual meals themfelves. Upon the fubject of tea and coffee, efpecially when taken after dinner, much difference of opinion prevails. Some have confidered tea as invariably noxious, but from oppofite caufes; one afferting that it is noxious only when the infufion is weak, another when it is ftrong; the former attributing its pernicious effects to the hot water alone, the latter to the narcotic quality of the tea. The laft opinion is, we believe, in a certain degree, correct. There is unqueftionably in a ftrong infufion of tea a quality, which excites diforder of the ftomach, head-ache, &c. in numerous individuals, and which, taken plentifully and late, will altogether prevent fleep for many hours, in ftill greater numbers. But the notion of the warm water relaxing and enfeebling the ftomach, is probably deduced, erroneoufly, from the effects of warm water on inanimate fubftances, and from the foddening of the cuticle after long immerfion in it. Warm water is doubtlefs a gentle *ftimulus* to the ftomach, and has been recommended, alone, for that purpofe, to invalids fuffering under dyfpepfia, or indigeftion. (See Saunders on the Liver.) In this view, then, a warm watery liquid may be ufeful to the digefting ftomach; and farther by diluting its contents, it muft facilitate the motions and commixture of them, and therefore tend to expedite the procefs of digeftion. Hence tea, not too ftrong, taken an hour or two after the meal of dinner, is, in our opinion, a falutary repaft. And it is well known that, among perfons of weak digeftive organs, the oppreffion of ftomach, occafioned by even a temperate meal, is fpeedily removed after drinking tea. According to this view of the matter, however, the lefs that is eaten with it, the better; for either fweet cakes, or cakes of any kind, efpecially with butter, muft rather retard digeftion than promote it. For, if whilft the ftomach is performing its tafk, a fecond quantity of food is added, although of a lighter quality, the whole mafs is augmented, and as the additional matter muft be affimilated to the chyle, now forming, the work of digeftion is impeded.

The imagination of fome phyficians has wandered far to defcribe the mifchiefs of this fuppofed enervating liquor, tea; and they would reprefent the picture as truly alarming. "Tea," fays a fenfible popular writer, "will induce a total change of conftitution in the people of this country. Indeed it has gone a great way towards effecting that evil already. A debility, and confequent irritability of fibre, are become fo common, that not only women, but even men are affected with them. That clafs of difeafes, which, for want of a better name, we call nervous, has made almoft a complete conqueft of the one fex, and is making hafty ftrides towards vanquifhing the other." (Buchan.) It has been frequently afferted by others, that the difeafes of this country have undergone a great change fince the days of Sydenham, from the fame caufe, and inftead of highly inflammatory fevers, we now fee thofe only of the low kind, accompanied by debility. This degeneration is, perhaps, not lefs fanciful, than that of the heroes of Homer and Virgil. Sydenham has defcribed a moft ample catalogue of nervous diforders under the head of hypochondriafis; and the meafles and fmall-pox are juft as inflammatory now, as in the time of that able phyfician. Or if a change be admitted to

have

have occurred in our conftitutions, it may be as juftly attributed to other changes in the mode of life, as to the fipping of tea; to the increafe of luxury in every rank, and every department of life.

In a ftate of actual difeafe, and efpecially in febrile complaints, a certain degree of caution is requifite; but not fo much, perhaps, as is often prefcribed. For, in the febrile ftate, the ftomach naturally loathes animal food, and is averfe in the extreme to the ftronger and more alkalefcent kinds, which it cannot be forced to take without much oppreffion, and increafe of the difeafe: but in the decline of the fever, the fick often crave the lighter forts of animal food, and ufe them with impunity. In this point, however, the feelings of the patient fhould be fpecially confulted; for, too often, the officioufnefs and miftaken kindnefs of nurfes and friends miflead the patient; they prefs upon him articles, which his own inftinctive fenfations would not have led him to defire, and which, therefore, injure him. The lower claffes, from among whom our nurfes are of courfe chofen, are with difficulty reftrained from pouring in wine and other ftimulants, in every ftage of febrile difeafes, from a notion that the patient will die for want of nourifhment, as they cannot eat, unlefs fomething comfortable is given.

Febrile thirft is moft effectually removed by fimple water; whether it be cold or tepid is perhaps of little importance; and in general as much ought to be given as is agreeable to the fick. Various forms of diluent drink, in which the properties of the water are fcarcely changed, except in its flavour, may be ufed; fuch as water in which currant-jelly, and various fyrups, have been mixed, or tamarinds, roafted apples, fage, balm, or other palatable ingredients.

In chronic difeafes, accompanied with hectic fever, it is important to fupport the ftrength of the body, without ftimulating the arterial fyftem; that is, by adminiftering a diet, which is at once nutritious, and eafy of digeftion. For this purpofe, a diet confifting chiefly of milk, with vegetables, and diluent drinks, is generally recommended. The milk of the afs and the goat, which contain a larger proportion of fugar, and lefs of the butyraceous and cafeous matter than cow's milk, and therefore are equally or more nutritive, and occafion lefs excitement during the procefs of digeftion, are frequently preferred. But cow's milk may be eafily rendered more faccharine or lefs cafeous by art, and its qualities apportioned to the powers of the ftomach. A ftrict perfeverance in a diet of this nature, and a rigid rejection of every thing ftimulating, liquid or folid, is in many chronic difeafes the moft valuable courfe of medicine, as it fupports the conftitution, without augmenting the difeafe, as a heating diet would do, and thus often affords the powers of the conftitution an opportunity of reftoring its own health, or removes all impediment to the operation of medicines.

The effects of a diet of animal matters exclufively, in removing the leading fymptoms, if not in curing the diftreffing and generally fatal difeafe, the DIABETES *mellitus*, has been ftrongly exhibited by Dr. Rollo; and it cannot be doubted that this diet has a much greater power over the fymptoms of this obfcure malady, than all the medicines which have as yet been adminiftered for its cure. See DIABETES.

As the gout, apoplexy, palfy, lethargy, and other difeafes of a full habit, arife from too great a quantity of blood, or of fat, &c. in the fyftem, a rigid temperance in diet is the moft effectual and unexceptionable mode of preventing and of removing the predifpofition to thefe difeafes. Dr. Gregory, the prefent profeffor of the practice of phyfic at Edinburgh, affords an animating example of the effect of ftrict temperance, with corporeal exercife, in completely banifhing the gout from the conftitution, although he had it hereditarily from both parents, and fuffered fome fevere attacks at an early period of life. In the inftance of the miller of Billericay, we have a ftill more ftriking inftance of the benefits derived from a proper change of diet, to the loweft degree of abftinence, in removing enormous corpulence, and all its attendant fymptoms of difeafe. (See CORPULENCY.) In fact, much of the adminiftration of medicines might be fuperfeded, would mankind fubmit their appetites in a fomewhat greater degree to the controul of reafon; and Dr. Cheyne's obfervation is very juft. Any one, he fays, may lofe a pound of blood, take a purge, or a fweat, by dropping the great meal, or by abftaining from animal food, or fermented liquors for four or five days, as effectually as by opening a vein, fwallowing a dofe of pills, or taking a fudorific bolus. Effay on Health, p. 35.

The diet of infants and children fhould be regulated with great attention. Many an infant is loft in confequence of improper food; for a ftate of irritation in the ftomach and inteftines, occafioned by crude and ill-digefted aliment, is one of the moft prolific fources of convulfions in the early periods, and of marafmus and tabes afterwards. Here, as in moft other points, we chiefly err, by neglecting the intimations of nature. The proper food for infants is pointed in the milk of the parent, and, therefore, in our attempts to fubftitute a diet, when that is not to be procured, or is not in fufficient abundance, it behoves us to imitate the food of nature.

DIET-*Drinks*, a form of phyfic, including all the medicated wines, wheys, and ales, ufed in chronic cafes. They require a courfe or continuance to anfwer any intention of moment. In acute cafes they are of no ufe; but where the diforder of the conftitution is gradually to be gained upon, much help may be had from them.

DIET, or *Dyet*, is alfo ufed for an affembly of the ftates or circles of the empire, or Poland, to deliberate and concert meafures for the public good.

The general diet of the empire is ordinarily held at Ratifbon. It confifts of the emperor in perfon, or by his reprefentative or commiffary; the nine electors, three of whom are ecclefiaftic, and the other fix fecular, forming the electoral college; the ecclefiaftical princes, *viz.* archbifhops, bifhops, abbots, and abbeffes, and the fecular princes, forming the fecond college; and the reprefentatives of the imperial cities, who conftitute the third college, and are divided into two benches, *viz.* that of Suabia and of the Rhine. This diet has been ufually fummoned by the emperor, but there are fome cafes in which the electors have fummoned it without his confent, or requefted him to fummon it. In the abfence of the emperor the right of convocation belongs to the king of the Romans. The diet makes laws, raifes taxes, determines differences between the feveral princes and ftates, and relieves the fubjects from the oppreffions of their fovereigns. The diets of the empire were originally the fame with affemblies of March and May, held by the kings of France: they met, at leaft, once a year; and every freeman had a right to be prefent. Thefe were affemblies, in which the monarch deliberated with his fubjects, concerning their common intereft: but when the princes, dignified ecclefiaftics, and barons, acquired territorial and independent jurifdiction, the diet became an affembly of the feparate ftates, which formed a confederacy of which the emperor was the head. Whilft the conftitution of the empire remained in its primitive form, the feveral members of the diet were obliged to attend in perfon, otherwife he not only loft his vote, but was liable to a heavy penalty. When the members of the diet became independent ftates, the right of fuffrage was annexed to the territory or dignity, not to the perfon; and the members might fend their deputies,

as princes fend ambaffadors. By degrees any member, who poffeffed more than one of thofe ftates or characters, which entitle to a feat in the diet, was allowed a proportionable number of fuffrages. The Imperial cities alfo, as foon as they became free and acquired independent jurifdiction, were received as members of the diet. The powers of the diet extend to every thing relative to the common concern of the Germanick body, or that even intereft or affect it as a confederacy. The diet takes no cognizance of the inferior adminiftration in the different ftates, unlefs that happens to threaten or difturb the general fafety. Robertfon's Hift. Charles V. vol i. p. 462.

The term diet is alfo applied to the affembly of electors for the choice of an emperor or king of the Romans: this is ufually held at Frankfort on the Main.

The general diet of Poland was by the laws only to be held every two years; but preffing occafions convened them every year; the laws alfo confined their fitting to fifteen days, but they frequently protracted it to fix weeks. The ufual place was at Warfaw, the capital of the kingdom; though it has been often held at other places: in effect, as by the laws every third diet was to be convened at Grodno, in Lithuania; whenever, for particular reafons, it was judged meet to change the order, and hold it elfewhere, the nobility of the grand duchy muft have confented to it. It was the king who fixed the time, and fummoned it by circulars letters fent to all the palatines. In an interregnum the archbifhop of Gnefna called the diet.

The feveral particular diets, which were held fix weeks before the general one, fent three deputies each, chofen out of the members thereof.

In Poland there were likewife diets on horfeback, held in the champagne, or country, fuch were thofe wherein they chofe their king. They were called pofpolites. See Poland.

There are likewife diets held in Switzerland; diets of the Proteftant cantons; diets of the Catholic cantons; and general diets. The firft affemble at Araw, and are convoked by the canton of Zurich; the fecond at Lucern, convoked by the canton of that name; the third, compofed of the deputies of all the cantons, both Proteftant and Catholic, is held twice a year, at the end of June, and the beginning of December, and meets at Baden. It is the canton of Zurich which has the right of convening it. See Switzerland.

DIETA, in our *Old Law Books*, denotes a day's journey. "Omnis rationabilis dieta conftat ex viginti milliaribus." Fleta.

DIETERSTORFF, in *Geography*, a town of Germany, in the archduchy of Auftria; four miles S.S.W. of Tuln.

DIETETIC, Diætetica, that part of phyfic which confiders the way of living, with relation to food, fuitable to particular cafes. See Diet.

DIETFURTH, in *Geography*, a town of Germany, in the centre of Bavaria, fituated on the north fide of the Altmuhl; 19 miles weft of Ratifbon.

DIETHUSA, in *Ancient Geography*, an ifland of the Ægean fea; reprefented by Pliny as a deferted ifland.

DIETMANFRIED, in *Geography*, a town of Germany, in the circle of Swabia, belonging to the abbey of Kempton; eight miles N.N.W. of Kempton.

DIETRICH, or Dietricy, Christian William Ernest, in *Biography*, a painter and engraver of confiderable merit, was born at Weimar in 1712, and refided chiefly at Drefden, where he was profeffor of the academy of arts. As a painter he poffeffed extenfive abilities, and fucceeded both in hiftory and landfcape. He alfo engraved a great number of fmall fubjects from his own compofitions, in the ftyle of Oftade, of Lairefle, and of Salvator Rofa. Several of thefe etchings are very rare. A print by this mafter of a "Satyr entertained by a Peafant and his Family," is finely drawn and admirably executed: it is dated 1739. The time of his death is not afcertained. Strutt.

DIETRICHSTEIN, in *Geography*, a fmall town of Auftria, in Upper Carinthia, belonging to the prince of Dietrichftein. It is fituated on the river Geyl, three miles weft of Arnoldftein.

DIETTER, Christian Ludwig, in *Biography*, born at Ludwifburg, 1757, performer on the violin, compofer, and maitre de chapelle to the duke of Wirtenburg, at Stuttgard. He was one of the firft fcholars of his ferene highnefs's academy, where he at firft ftudied painting, and had the opportunity of hearing lectures in mythology, hiftory, and geography; but devoted all his leifure hours to mufic. The duke, obferving his mufical talents, advifed him to cultivate them exclufively. He accordingly ftudied under Schubart, and the celebrated violinift, Celeftini, who came from Rome to England with the late duke of Dorfet, and after remaining in London feveral years, went to Stuttgard, where he was placed at the head of the opera-band. Ditter, whofe thirft for knowledge was infatiable, wifhing to ftudy the theory of mufic regularly, and finding that he could get no inftructions from the maeftro di cappella Bononi, ftudied the works of Jomelli, and other famous compofers; and in the year 1778 gained a prize medal for compofition, which he had gained two years before on the violin. He continued to refide in the duke's academy, or confervatorio, till the year 1781, and compofed various works for the theatre as well as for public concerts.

DIETZ, in *Geography*, a fmall town of Germany, in the circle of the Upper Rhine, on the river Lahn, formerly the capital of the principality of Naffau Dietz, and as fuch belonging to the prince of Orange, but fince the peace of Tilfit, in the confcription of the new kingdom of Weftphalia. It is 18 miles E. of Coblentz, 30 N. of Mayence. Lat. 50° 22′. See Nassau.

DIEU, Lewis de, in *Biography*, an eminent proteftant divine, was born at Flufhing about the year 1590, where he afterwards became paftor to the French church. He was an ufeful and popular preacher, and might have been appointed court minifter at the Hague, an honour which he declined, though preffed upon him by prince Maurice of Orange, who had heard him preach at Zealand. In 1619, he was appointed affiftant to his uncle at the Walloon college at Leyden; the duties of this fituation he performed with diligence and credit, until his death, which happened in the year 1642. His publications were moftly theological; fuch as "A Commentary on the Four Gofpels;" "Notes on the Acts of the Apoftles;" &c. &c. M. Bayle has given the titles of a long lift of works, which he publifhed during his life, or which were given to the world foon after his deceafe. By them it fhould feem that he was a learned and very refpectable divine. Bayle. Moreri.

Dieu, *l'Ile*, or *l'Ile d'Yeu*, in *Geography*, a fmall ifland on the weftern coaft of France, 9 miles S.W. of Saint Jean de Mont, and 15 W. of Saint Gilles. W. long. 2° 10′. N. lat. 46° 50′. It is a rock of granite, of a fuperficies of nearly four miles, covered with a very thin foil of a fandy earth, the produce of which is hardly fufficient for the confumption of its inhabitants for the fpace of three or four months. The paftures are fo fcanty, that they feed only a very few cows and fheep. The women till the ground, moft of the men being engaged as failors and fifhermen. There is one fmall town, the harbour of which is inconvenient, and incapable of being fitted for trade. The whole ifland contains fix fquare leagues, or 27,600 French arpens. It forms a canton of the

the diſtrict of the Sables d'Olonne, in the department of La Vendée. The town has 1049 inhabitants. The whole canton or iſland has two communes, and 2053 inhabitants. Herbin. Statiſtique de la France.

Dieu le Fit, a ſmall town of France, in the department of the Drôme, chief place of a canton in the diſtrict of Montelimart, 15 miles E. of that place. It has ſome mineral ſprings, one of which is particularly remarkable for the great quantity of native vitriol which its water contains. This water, taken inwardly, is an excellent remedy againſt thoſe diſeaſes of the eyes which require tonics; it diſſipates inflammation, ſtrengthens the ſight, and cures beſides all cutaneous diſeaſes, and long-ſtanding ulcers.

The population of Dieu-le-Fit amounts to 2847 individuals. The canton contains, upon a territorial extent of 330 kiliometres, 16 communes, and 8636 inhabitants.

Dieu *& mon droit, q. d. God and my right*, the motto of the arms of England, firſt given by king Richard I. to intimate, that he held not his empire in vaſſalage of any mortal.

It was afterwards taken up by Edward III. when he firſt claimed the crown of France; and it was continued, without interruption, to the time of king William III. who uſed the motto *Je maintiendray;* though he commanded the former to be retained on the great ſeal. The ſame is to be underſtood of the late queen Anne, who uſed the motto *Semper eadem;* which had been before uſed by queen Elizabeth.

Dieu *ſon act*, in *Law*, are words often uſed in our old law; and it is a maxim in law, that the act of God ſhall prejudice no man. Therefore, if a houſe be blown down by a tempeſt, thunder, or lightning, the leſſee or tenant for life or years, ſhall be excuſed in waſte. Likewiſe he hath by the law a ſpecial intereſt to take timber to build the houſe again for his habitation. (4 Rep. 63. 11 Rep. 82.) So when the condition of a bond conſiſts of two parts in the disjunctive, and both are poſſible at the time of the obligation made, and afterward one of them becomes impoſſible by the act of God, the obligor is not bound to perform the other part. (5 Rep. 22.) And where a perſon is bound to appear in court at a certain day, if before the day he dieth, the obligation is ſaved, &c. See Bond.

DIEUE, in *Geography*, a town of France, in the department of the Meuſe, and diſtrict of Verdun, on the Meuſe; ſix miles S. of Verdun.

DIEULISH, a river of England, which runs into the Stour, near Sturminſter, in Dorſetſhire.

DIEULOWARD, a town of France, in the department of the Meurte, on the Moſelle, and diſtrict of Pont-a-Mouſſon; three leagues N. N. W. of Nancy.

DIEUPART, Charles, in *Biography*, we believe, was a native of France, but who had reſided ſo long in England, that his name only ſuggeſted the idea of his not being an Engliſhman. We have been informed, by thoſe who remembered him, that he was a correct and firm performer on the violin, and aſſociated with Clayton, and Nicola Haym, as leader of the band at Drury-lane and Dorſet-gardens, in the firſt attempts at operas, after the Italian manner. Dieupart, conſequently, played the firſt violin in the operas of Arſinoe, and Camilla, when they were performed in 1705, entirely in Engliſh; and in 1707, in Addiſon's Roſamond, ſet by Clayton. But on the arrival of Valentini, when operas were performed half in Engliſh, and half in Italian; and in 1710, on the arrival of Nicolini and Handel, Clayton, Haym, and Dieupart, diſcouraged from any further attempts at operas by Engliſh performers, were obliged to ſolicit the encouragement of the public in eſtabliſhing a concert, which they propoſed to carry on jointly at Clayton's houſe, in York buildings, where there was a large room, which had long been appropriated to concerts. The propoſals for this undertaking are inſerted in two letters printed in the Spectator, Nos 258 and 278. This aſſociation continued but a ſhort time; for, in 1711, we find Clayton engaged with ſir Richard Steele, in a ſubſcription at York buildings. Haym went to the Haymarket, became a performer in the opera band, was frequently the opera poet, and ſometimes the compoſer; while Dieupart betook himſelf to teaching the harpſichord, and was admitted in that capacity into ſome of the beſt families in the kingdom; but late in life, he degenerated into negligence and a vulgar taſte; leading low concerts at ale-houſes in obſcure parts of the town, where he won all hearts by his neat and elegant manner of playing Corelli's ſolos, which he might have done in better company, if, like poor Smart the poet, he had not, during his derangement, preferred foul linen to clean. Dieupart had a great paſſion for diſguiſing himſelf like a common fidler, and playing in booths at fairs. The late Mr. Naphthali Frankes (a firſt rate dilettante on the violin) found him out at May fair in that capacity, by his ſtyle of playing, in which he did not remember to diſguiſe his bow, his tone, or his taſte. He died about the year 1740 at a great age, and in very indigent circumſtances. We find in the Dutch catalogues of the time, ſix ſets of harpſichord leſſons by Dieupart, which he afterwards transformed into concertos for the violin, flute, baſe-viol, and arch lute.

DIEUZE or Dieuse, in *Geography*, a ſmall town of France, in the department of the Meurthe, chief place of a canton in the diſtrict of Chateau Salins, ſituated on the river Seille, between Metz and Saverne, ſix miles E. of Marſal, and 27 N. W. of Nancy. Lat. 48° 50′. It has the richeſt ſalt ſprings in France. Their annual produce averages 256,908 French quintaux.

Dieuze contains 3344 inhabitants. The canton reckons 10,050, diſtributed in 24 communes, upon a territorial extent of 187½ kiliometres. Herbin Statiſtique de la France.

DIEXAHÆDRIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek δις, *twice*, εξ. *ſix*, and ἑδρα, *ſide*. The bodies of this genus are ſpars, compoſed of twice ſix planes, being formed of two hexædral pyramids, joined baſe to baſe, without any intermediate column. Of this genus there are only two known ſpecies: 1. One with long, narrow, and ſharp-pointed pyramids, found in Lamb's-cave on Mendip hills: and, 2. One with long, broad, and obtuſe pyramids: this is found in the mine of Goſſelar in Saxony, and in many of the mines of the Hartz Foreſt. Hill's Hiſt. of Foſſils, p. 213.

DIEXODUS, Διεξοδος, in *Rhetoric*, is uſed for *digreſſion*, which ſee.

DJEZAN, in *Geography*, a ſea-port of Arabia, ſituated on a cape of the Red ſea, which forms one ſide of a large bay, in N. lat. 16° 45′. It is built, like other towns, on the coaſt, with ſtraw and mud. It was once a conſiderable place for trade, but ſince coffee hath been ſo much in demand, of which they have none, that commerce is removed to Loheia and Hodeida. It is an uſurpation from the territory of the Imam, by a ſheriff of the family of Beni-Haſſan, called "Bovariſh." The inhabitants, ſays Bruce, are all ſheriffs, in other terms, troubleſome ignorant fanatics. This town is peculiarly ſubject to fevers. The *faunteit*, ſignifying Pharaoh's worm, or worm, is very frequent here. The place abounds with excellent fiſh, and fruit which is brought from the mountains, whence they are alſo ſupplied with very good water.

DIEZE Maxime of Rameau, in *Muſic*, is an interval whoſe

DIF

whofe ratio is $\frac{243}{250}$, or $25\Sigma + f + 2m$, which is the SEMITONE *fubminimis*, which fee.

DIEZE *Major* of Rameau, is an interval whofe ratio is $\frac{125}{128}$, or $21\Sigma + 2m$, which is the *enharmonic* DIESIS, which fee.

DIEZE *Minor* of Rameau, is an interval whofe ratio is $\frac{3072}{3125}$, or $15\Sigma + f + m$, which is the HYPEROCHE, which fee

DIEZE *Minime* of Rameau, is an interval whofe ratio is $\frac{19683}{20000}$, or $14\Sigma + f + m$; its common logarithm is .9930612,9682. It refults from the addition of the following intervals, *viz.* a diafchifma and a minor refidual: a major comma and a medius refidual; alfo as the difference of the following intervals, *viz.* a fchifma from an hyperoche; a major comma from a femitone fubminimis; and a femitone minimum from a limma; alfo a major third and five minor thirds from four minor fourths, which laft gives a practical method of tuning the dieze minime on an organ, &c.

DIFF, is the name of an inftrument of mufic among the Arabs, ferving chiefly to beat time to the voice: it is a hoop, fometimes with pieces of brafs fixed to it to make a jingling, over which a piece of parchment is diftended. It is beat with the fingers, and is the true tympanum of the ancients. Ruffell's Hift. of Aleppo, p. 94.

DIFFARREATION, among the Romans, a ceremony whereby the divorce of their priefts was folemnized.

The word comes from the prepofition *dis*; which is ufed in compofition, for divifion, or feparation; and *farreatio* a ceremony with wheat, of *far*, wheat.

Diffarreation was properly the diffolving of marriages, contracted by confarreation; which were thofe of the pontifices, or priefts. Feftus fays, it was performed with a wheaten cake. Vigenere will have confarreation and diffarreation to be the fame thing.

DIFFERENCE, in *Logic*, an effential attribute belonging to fome fpecies, and not found in the genus; being the idea that defines the fpecies.

Thus, body and fpirit are the two fpecies of fubftance, which in their ideas include fomething more than is included in the idea of fubftance. In body, for inftance, is found impenetrability, and extenfion; in fpirit, a power of thinking, and reafoning: fo that the difference of body is impenetrable extenfion, and the difference of fpirit is cogitation.

DIFFERENCE, in *Mathematics*, the excefs of one quantity above another.

When a lefs quantity is fubtracted from a greater, what remains is called the difference.

It was a fundamental principle among the ancient geometers, that the difference of any two unequal quantities, by which the greater exceeds the leffer, may be added to itfelf, till it fhall exceed any propofed finite quantity of the fame kind. This principle feems inconfiftent with the fuppofition of an infinitely fmall quantity or difference, which added to itfelf any number of times, is never to be fuppofed to become equal to any finite quantity whatfoever; which is the foundation of the modern method of infinitefimals. However, this laft may, with proper caution, be made ufeful and accurate.

DIFFERENCE *of longitude* of two places, is an arch of the equator intercepted between the meridians of the places.

DIFFERENCE, *Afcenfional*, in *Aftronomy*. See ASCENSIONAL.

DIFFERENCES, in *Heraldry*, certain additaments to coat-armour; whereby fomething is altered, or added, to diftinguifh the younger families from the elder, or to fhew how far they are removed from the principal houfe. They are called, in Latin, diminutiones, and difcernicula armorum; and, by the French, brifures.

Of thefe differences Sylv. Morgan gives us nine, which obtain principally among us: *viz.* the label, which denotes the firft and eldeft fon; the crefcent, the fecond; the mullet, the third; the martlet, the fourth; the annulet, the fifth; the fleur-de-lis, the fixth; the rofe, the feventh; the crofs-moline, the eighth; and the eight-foil, the ninth. See each under its proper article.

Again, as the firft differences are fingle for the fons of the firft houfe, or defcent; the fons of the younger houfes are differed by combining or putting the faid differences upon each other. As the firft differences are, the label, crefcent, &c. for the firft houfe; the difference for the fecond houfe is the label on a crefcent, for the firft of that houfe, during his father's life only; for the fecond, a crefcent charged with a crefcent; for the third brother of the fecond houfe, a mullet on a crefcent, &c. Sifters, except of the blood-royal, have no other mark of difference in their coats of arms befides the form of the efcutcheon. See LOZENGE.

The original of differences is controverted. Camden will have them to have begun about the time of king Richard I. Paradin affigns differences worn as early as the year 870. The prefident Fauchet obferves differences to have been hereditary in the French families before the time of Louis le Gros, who came to the crown in the year 1110. Moreau refers them to the time of St. Louis; and Lallonette, Belle-foreft, &c. to that of Philip Auguftus. The occafion of their rife is well accounted for by Colombiere.

All nations, fays he, prefer the eldeft brothers to the younger; whence thofe, in a direct line, fucceeding to their fathers, and becoming mafters of their lands, took on them their coat-armour, without any change, or alteration; and tranfmitted the fame again to their eldeft fons; the younger brothers, or baftards, not being allowed to bear the fame arms, without fome additional mark, to diftinguifh them from the elder. Hence fome heralds, he goes on, have endeavoured to confine them to certain fixed and determinate figures, for diftinguifhing the fecond from the firft, the third from the fecond, and fo on to the fixth; affigning the fecond a label, the third a bordure, the fourth an orle, the fifth a battoon, and the fixth a bend or cottice. And the defcendants of thefe bear double differences, or differences charged on one another; *viz.* the eldeft fon of the fecond fon to retain his paternal coat, with the difference of the label of three points; the fecond, the label of four points; the third, fuch a label on a chief; the fourth, a label charged with certain figures, as eaglets, lioncels, martlets, crefcents, rofes, &c. And, for the fame reafon, the fecond fon of the third fon fhall bear a bordure engrailed; the third, a bordure charged with bezants, or tourteaux, &c.

But the fame author judges the fixing any certain invariable differences at all an abufe; becaufe they may happen not to be agreeable to the paternal coat, but very much deface and blemifh it. He adds, that many other figures, befide thofe above-mentioned, may be ufed as differences; as fhells, bezants, cinquefoils, and a thoufand more. Some younger families have made the difference in their arms by only diminifhing the ordinaries, or changing the pofture; and others, by only changing the metal, or colour.

It muft be added, that the difference may be of metal on metal, or colour on colour; which, in other cafes, is falfe heraldry.

DIFFERENCES, *Ancient*. See BORDURES.

DIFFERENTIAL, DIFFERENTIALE, in the *Higher Geometry*, an infinitely fmall quantity, or a particle of quantity fo fmall as to be lefs than any affignable one. See FLUXION.

It is called a differential, or differential quantity, becaufe frequently confidered as the difference of two quantities; and, as fuch, it is the foundation of the differential calculus. Sir Ifaac Newton, and the Englifh, call it a moment, as being confidered as the momentary increafe or decreafe of a variable quantity. Mr. Leibnitz, and others, call it alfo an infinitefimal. See INFINITESIMAL.

DIFFERENTIAL *of the firft, fecond, &c. degree.* See DIFFERENTIO-DIFFERENTIAL.

DIFFERENTIAL *calculus*, or *method*, is a method of differencing quantities; that is, of finding a differential, or infinitely fmall quantity, which, taken an infinite number of times, is equal to a given quantity. See CALCULUS, DIFFERENTIAL *method*, and FLUXIONS.

DIFFERENTIO-DIFFERENTIAL *calculus*, is a method of differencing differential quantities.

As the fign of a differential is the letter d prefixed to the quantity, dx is the differential of x; that of a differential of dx is ddx, and the differential of ddx is $dddx$, &c. fimilar to the fluxions $\dot{x}$, $\ddot{x}$, $\dddot{x}$, &c.

Thus we have degrees of differentials.

The differential of an ordinary quantity is called a differential of the firft order or degree, as dx; that of the fecond degree, is an infinitefimal of a differential quantity of the firft degree, as ddx; that of the third degree, is an infinitefimal of a differential quantity of the fecond degree, as $dddx$, and fo on.

The powers of differentials are differenced after the fame manner as the powers of ordinary quantities: and, again, as compound differentials either multiply or divide each other, or are powers of differentials of the firft degree; differentials are differenced after the fame manner as ordinary quantities; and, therefore, the differentio-differential calculus is the fame, in effect, with the differential, or the method of fluxions.

DIFFERENTIAL, in the *Doctrine of Logarithms.* Kepler calls the logarithms of tangents differentiales; which we ufually call artificial tangents. See LOGARITHM, MESO-LOGARITHM, and TANGENT.

DIFFERENTIAL *equation* is ufed by fome mathematicians for an equation involving infinitefimal differences, or fluxions. Thus the equation $3x^2dx - 2axdx + aydx - 3y^2dy + axdy = 0$ in the foreign notation, or $3xx\dot{x} - 2ax\dot{x} + ay\dot{x} - 3y^2\dot{y} + ax\dot{y} = 0$ in the Englifh notation, is called a differential equation. But thefe equations fhould, confiftently with the Englifh, or fir Ifaac Newton's notation, be rather called fluxional equations. Hence fome of our mathematicians have applied the term differential equations in another fenfe, to certain equations defining the nature of feriefes. See SERIES.

DIFFERENTIAL *method*, in *Mathematics*, an appellation given to a method of finding quantities by means of their fucceffive differences.

This method is capable of very extenfive application and ufe, in the conftruction of tables, fummation of feriefes, &c. It was firft ufed, and the rules of it laid down, by Briggs, in his conftruction of logarithms and other numbers, much in the fame manner as they were afterwards taught by Cotes, in his "Conftructio Tabularum per Differentias." See Briggs's Arithmetica Logarithmica, cap. 12, 13. and his "Trigonometria Britannica."

This method is given in another form by fir Ifaac Newton in the fifth lemma of the third book of his Principia. He treats of it as a method of defcribing a curve of the parabolic kind, through any given number of points: And he diftinguifhes two cafes of this problem; the firft, when the ordinates, drawn from the given points to any line given in pofition, are at equal diftances from each other; and the fecond, when thefe ordinates are not at equal diftances. He has given a folution of both cafes, but without demonftration in that place, which has fince been fupplied by himfelf and others. See his Methodus Differentialis, publifhed with other tracts of the fame author, by Mr. Jones, London, 1711; and Stirling's Explanation of the Newtonian differential method, in the Phil. Tranf. N° 362; Cotes, De Methodo Differentiali Newtoniana, in his works publifhed by Dr. Smith; Herman, Phoronomia; and Le Seur and Jacquier, in their Comment on fir Ifaac Newton's Principia.

It is to be obferved, that the methods there demonftrated, by fome of thefe authors, extend to the defcription of any algebraic curve through a given number of points, which fir Ifaac, writing to Mr. Leibnitz, mentions as a problem of the greateft ufe.

By this method, fome terms of a feries being given, and fuppofed to be placed at given intervals, any intermediate term may be found nearly; and this therefore gives a method for interpolations. Briggs's Arith. Log. Newton Method. Differ. prop. 5. Stirling's Method. Diff.

Any curvilinear figure may alfo be fquared nearly, of which fome ordinates may be found. Newt. Meth. Diff. prop. 6. Cotes, ubi fupra. Simpfon's Math. Diff p. 115.

And this method may be extended to the conftruction of mathematical tables by interpolation. Newt. Meth. Diff. in Schol. p. 100.

The fucceffive differences of the ordinates of parabolic curves, becoming ultimately equal, and the intermediate ordinate required, being determined according to fir Ifaac's rules, by thefe differences of the ordinates, is the reafon of this method being called the differential method. To be a little more particular.

The firft cafe of fir Ifaac's problem amounts to this: a feries of numbers, placed at equal intervals, being given, to find any intermediate number of that feries when its interval from the firft term of the feries is given.

Subtract every term of the feries from the next following, and let the remainders be called firft differences; then fubtract each difference from the next following, and let thefe remainders be called fecond differences; again let each fecond difference be fubtracted from the next following, and let thefe remainders be called third differences, and fo on: then if A be the firft term of the feries, d' the firft of the firft differences, d'' the firft of the fecond differences, d''' the firft of the third differences, &c. and if x be the interval between the firft term of the feries and any term fought, E, that is, let the number of terms from A to E, both inclufive, be $= x + 1$, then will the term fought,

$$E = A + \frac{x d'}{1} + \frac{\overline{x}\ \overline{x-1}}{1.2} d'' + \frac{x.\overline{x-1}.\overline{x-2}}{1.2.3} d''' + \frac{x.\overline{x-1}.\overline{x-2}.\overline{x-3}}{1.2.3.4} d'''' +, \text{\&c.}$$

which feries differs from the Newtonian in this, that the quantities $\frac{d''}{1.2}$, $\frac{d'''}{1.2.3}$, $\frac{d''''}{1.2.3.4}$ here ufed, fignify the fame with d'', d''', ufed by fir Ifaac Newton.

Hence, if the differences of any order become equal, that is, if any of the quantities d'', d''', d'''', become $= 0$, we fhall have a finite expreffion for E, the term fought; it be-

ing evident, that the feries muft terminate when any of the differences d'', d''', &c. become = o.

It is alfo evident, that the coefficients $\frac{x}{1}$, $\frac{x \cdot \overline{x-1}}{1 \cdot 2}$, &c. of the differences, are the unciæ of the binomial theorem.

E. G. Suppofe it were required to find the log. tangent of 5′, 1″, 12‴, 24⁗, or 5′, 1″, $\frac{62}{300}$, or 5′, 1″, 2066, &c.

Take out the log. tangents to feveral minutes and feconds, and take their firft and fecond differences, thus:

	Tang.	d'	d''	
5′ 0″	7.1626964			
		14453		
5 1	7.1641417		−49	
		14404		−48.
5 2	7.1655821		−47	
		14357		
5 3	7.1670178			

Here A = 7.164147 ; $x = \frac{62}{300}$; $d' = 14404$; and the mean fecond difference $d'' = -48$. Hence

A	7.1641417
$x d'$	2977
$\frac{x}{1} \cdot \frac{x-1}{1} d''$	4
Therefore, the tangent of 5′, 1″, 12‴, 24⁗, is	7.1644398

A method may be deduced from the foregoing expreffion, of finding the fums of the terms of fuch a feries. For if we imagine a new feries, whereof the firft term fhall be = o, the fecond = A, the third = A + B, the fourth = A + B + C, the fifth = A + B + C + D, and fo on, it is plain that the affigning one term of this feries is finding the fum of all the terms, A, B, C, D, &c. Now fince thofe terms are the differences of the fums o, A, A + B, A + B + C, A + B + C + D, and that by the fuppofition, fome of the differences of A, B, C, D, &c. are = o; it follows that fome of the differences of the fums will alfo be = o; and that whereas in the feries $A + x d' + \frac{x \cdot \overline{x-1}}{1 \cdot 2} d''$, &c. by which a term was affigned, A reprefented the firft term, d' the firft of the firft differences, and that x reprefented the interval between the firft term and the laft, we are to write o inftead of A, A inftead of d', d' inftead of d'', d'' inftead of d''', &c. and $x + 1$ inftead of x, which being done, the feries expreffing the fums will be $0 + \frac{x+1}{1} A + \frac{\overline{x+1} \cdot x}{1 \cdot 2} d' + \frac{\overline{x+1} \cdot x \cdot \overline{x+1}}{1 \cdot 2 \cdot 3} d'' +$, &c. or $\overline{x+1} \times \overline{A + \frac{x}{2} d' + \frac{x \cdot \overline{x-1}}{2 \cdot 3} d'' + \frac{x \cdot \overline{x-1} \cdot \overline{x-2}}{2 \cdot 3 \cdot 4} d'''}$, &c.

Or, again, if the real number of terms of the lines be called z, that is, if $z = x + 1$, or $z - 1 = x$, we fhall have the fum of the feries $= z \times \overline{A + \frac{z-1}{2} d' + \frac{\overline{z-1} \cdot \overline{z-2}}{2 \cdot 3} d'' + \frac{\overline{z-1} \cdot \overline{z-2} \cdot \overline{z-3}}{2 \cdot 3 \cdot 4} d''' +}$, &c. See De Moivre, Doct. of Chances, p. 59, 60. Mifc. Analyt. p. 153. Simpfon's Eff. p. 95.

For inftance, let it be required to find the fum of fix terms of a feries of the fquares of the natural numbers 1 + 4 + 9 + 16 + 25 + 36. Thus,

Terms.	d'	d''	d'''
1			
	3		
4		2	
	5		0
9		2	
	7		0
16		2	
	9		
25, &c.			

Here A = 1, $d' = 3$, $d'' = 2$, $d''' = 0$, and $z = 6$. The fum confequently will be

$$= z \times \overline{1 + \frac{z-1}{2} \times 3 + \frac{\overline{z-1} \cdot \overline{z-2}}{2 \cdot 3} \times 2}$$

$$= z \times \overline{1 + \frac{3z-3}{2} + \frac{zz-3z+2}{3}}$$

$$= z \times \frac{6-9+9z+2zz-6z+4}{6}$$

$$= z \times \frac{1+3z+2zz}{6} = \frac{z \cdot \overline{1+z} \cdot \overline{1+2z}}{6} = \frac{6 \cdot 7 \cdot 13}{6} = 91.$$

This eafy example will be fufficient to fhew the applications of this rule. Thofe who are defirous of feeing its ufe in queftions of chance, may confult M. de Moivre's Doctrine of Chances, p. 59, feq. Various other inftances of the ufe of this rule in finding fums of progreffions of figurative members, &c. may be feen in Mifc. Analyt. p. 154, feq.

As to the differential method, it is to be obferved, that though fir Ifaac and others have treated it as a method of defcribing an algebraic curve, at leaft of the parabolic kind, through any number of given points; yet the confideration of curves is not at all effential, though it may help the imagination. The defcription of a parabolic curve through given points, is the fame problem as the affigning of quantities from their given differences, which may always be done by algebra, and by the refolution of fimple equations. See Mr. Stirling's Methodus Differentialis, p. 97. This ingenious author has treated fully of the differential method, and fhewn its ufe in the folution of fome very difficult problems. See SERIES.

DIFFERENTIAL *fcale*, in *Algebra*, is ufed for the fcale of relation fubtracted from unity. See *Recurring* SERIES.

DIFFORM, DIFFORMIS, from *forma*, fhape, is a word ufed in oppofition to uniform; and fignifies that there is no regularity in the form, or appearance, of a thing.

The botanifts ufe it as a diftinction of the flowers of feveral fpecies of plants.

DIFFRACTION *of* LIGHT, is the bending of the rays of light, which is occafioned by their paffing by other bodies. Thus, if the light of the fun be admitted through a hole in a room, otherwife darkened or clofed, the image of the fun within the room will be found to be larger than it ought to be, if the rays proceeded in ftraight lines from the fun to the fcreen within the room. Alfo, if a hair, a wire, or other fmaller body, be placed in the pencil of light which comes through the above-mentioned hole, the image of, or fhadow of it, will be much larger than the hair or wire itfelf; which fhews that the rays of light are bent in paffing by the fides of the hole, or of the hair, &c. This bending has been called diffraction; but more commonly INFLECTION *of Light*, which fee.

DIFFUSE, DIFFUSIVE, is chiefly ufed for a prolix manner of writing, &c.

A dictionary cannot well be too diffufive: for a man is never

never too much informed of the word he wanted; and he is not obliged to read that part of the explication which does not concern him.

A diffufive ftyle is proper for difcourfes in the demonftrative kind. Demofthenes is clofe, and concife; Cicero, on the contrary, is diffufive.

Diffuse, in *Botanical Phrafeology*, is applied to the loofely fpreading panicle of Oats and many other graffes, and of London Pride *Saxifraga umbrofa*, as well as of various other flowers. It is alfo ufed to characterize the ftems of various plants which fpread in a lax indeterminate manner on the ground; for inftance the Common Chickweed or *Stellaria media*, Sm. Fl. Brit. and the no lefs common *Veronica Chamædrys*, and *agreftis*, fuch ftems being generally procumbent at their origin, and afcending towards the extremity.

DIFFUSION, from *diffundo*, I pour out. I dilate, the act whereby a body is fpread, or ftretched out, fo as to take up more fpace.

The fchoolmen make three kinds of diffufion: the firft, that whereby a pure quality is diffufed; as cold, force, &c. This they diftinguifh into equal, whereby equal portions, or degrees, of the quality are diftributed upon equal parts of the medium; thus, when a direct motion is impreffed on a moveable, all the parts of the moveable receive an equal impetus; and unequal, when unequal degrees of the quality are diftributed on different parts of the fubject; thus it is, that force is impreffed on a lever, and cold propagated through a medium.

The fecond kind of diffufion is that performed by the motion of bodies: fuch is the diffufion of light, found, fmell, magnetic, electric virtues, &c.

The third is performed partly by the motion of corpufcles, and partly by the diffufion of a quality; and thus they hold fire to be diffufed.

But the modern philofophers reject the notion of qualities, and their diffufion. According to them, there is no other diffufion, but that of corporeal fubftance, emitted in minute effluvia, or particles, into a kind of atmofphere all around the body; which diffufion of corpufcles fome call atmofpherical, as being fuppofed to be terminated by a circle, whereof the diffufing body is the centre. Every body, it is now proved, has its fphere of activity, or diffufion, within which the particles, or corpufcles, torn from it, and flying away, have a fenfible effect; as we fee in odorous, fonorous, &c. bodies. See Quality; where the phyfical law of the diffufion of qualities is laid down.

DIG, in *Agriculture*, a term which is fometimes provincially applied to a mattock, and which likewife fignifies the breaking up the ground by a fpade or other fimilar tool.

Dig, in *Geography*, a town of Hindooftan, in the country of Mowat; 63 miles fouth of Delhi.

DIGAMMA. See F.

DIGAMY, the fame with bigamy. See Bigamy.

DIGASTRICUS, in *Anatomy*, one of the mufcles of the lower jaw, called alfo by the name of biventer maxillæ inferioris. It is defcribed in the article Deglutition.

DIGBA, in *Ancient Geography*, a town of Afia, fituated on the bank of the Tigris. Pliny places it in Babylonia, and Ptolemy in Mefopotamia.

DIGBY, *Sir* Kenelm, in *Biography*, was the fon of fir Everard Digby, who was executed for the fhare which he had in the gunpowder-plot. Kenelm was but three years old when he loft his father. Great care was taken to initiate him in the Proteftant religion, and at a proper age he was fent to Oxford to complete his ftudies. He then made the tour of Europe, and on his return was prefented to the king, who not only gave him a gracious reception, but conferred on him the honour of knighthood. This was in 1623. He afterwards appeared with fplendour at the court of Charles I., by whom he was greatly efteemed. This prince made him gentleman of his bed-chamber, firft commiffioner of the navy, and a governor of the Trinity-houfe. He likewife granted him letters of reprifal againft the Venetians, and with a fmall fleet fitted out at his own expence, he obtained fome brilliant fucceffes. He had long been regarded as a prodigy of learning, and he now returned to his native country with a high reputation for true valour and enterprize. Upon a vifit to France fir Kenelm, warmly affailed by fome ecclefiaftics, was reclaimed to the religion of his fathers, and in 1636 reconciled himfelf to the church of Rome. He foon difplayed the zeal of a new convert, by publicly defending the faith he had adopted, in two diftinct works. On the commencement of the troubles with Scotland, fir Kenelm was inftigated by the queen to write to the Catholics of England, to obtain from them a voluntary contribution, in fupport of the expedition againft the Scots: for this he was afterwards imprifoned by the parliament; but during his confinement, which was probably not very rigorous, he occupied himfelf with philofophical fpeculations. He wrote obfervations on the "Religio Medici" of fir Thomas Browne, which have been highly efteemed, as well on account of the politenefs of the language, as the acutenefs with which he confutes fome of the notions of the author. He exhibited alfo a good tafte for allegorical interpretations, by an elaborate commentary on a ftanza in the ninth canto of the fecond book of the Fairy Queen, in which Spencer has introduced fome of the myfteries relative to numbers. He was at length liberated, and went to France, where he was well received; and at this period he became acquainted with Des Cartes. Thefe philofophers had many long and learned converfations on the nature of the foul, and on other interefting topics, upon fome of which they could not agree; but they parted full of mutual efteem for each other. At Paris he publifhed, in 1644, his own philofophical fyftem, in two parts, entitled "A Treatife of the Nature of Bodies," and "A Treatife declaring the Operations and Nature of Man's Soul, out of which the Immortality of reafonable Souls is evinced." When the caufe of Charles was hopelefs, fir Kenelm came over to England, to make compofition for his eftate, but he was not permitted to remain in England, and parliament denounced againft him the penalty of death, fhould he return again without permiffion. This was granted him by Cromwell in 1655, when he continued engaged in his own affairs the greater part of the year, and it is believed that he was likewife employed in conciliating the Catholic party to the protector's adminiftration, upon the condition of a free toleration, a meafure to which Cromwell was by no means averfe. Sir Kenelm refided in the fouth of France in 1656 and 1657, frequenting the fociety of the learned and ingenious, before whom he was fond of making a parade of his philofophical knowledge. He afterwards refided in Germany for two years; but on the reftoration he came again to his native country, where he met with a polite reception at court, but was not brought forward into active life. Henceforward he fpent his time in a learned retreat, frequenting the meetings of the Royal Society, of which he was a member, and receiving the vifits of men of fcienee, at his own houfe in Covent Garden. He fuffered very much from repeated attacks of the ftone, which, in 1665, put an end to his life, at the age of fixty-two. In early life lord Clarendon defcribed fir Kenelm as a man of a very extraordinary perfon and prefence, which drew the eyes of all men upon him, which were more fixed by a wonderful graceful beha-

viour,

viour, a flowing courtesy and civility, and such a volubility of language as surprised and delighted; and though in another man it might have appeared to have somewhat of affectation, it was marvellously graceful in him, and seemed natural to the size and mould of his person, to the gravity of his motion, and the tune of his voice and delivery.' He married the only daughter of sir Edward Stanley, son of the earl of Derby, by whom he had three sons, the eldest of whom was killed at Brentford, in an engagement with the parliament forces: the youngest died in his infancy, and the other son left two daughters. Biograph. Brit.

DIGBY, in *Geography*, a town of Nova Scotia, on the south-east side of Annapolis bay, 18 miles south-west of Annapolis, and 53 north by east of Yarmouth; it is one of the most considerable of the new settlements in this province.

DIGBY, *Cape*, a cape on the east coast of Kerguelen's land, S. lat. 49° 23'. E. long. 78° 34'.

DIGENA, in *Ancient Geography*, a town of Arabia Felix. Ptolemy.

DIGENTIA, a river of Italy, now called *Lincenza*. It passed near the country-house of Horace, and discharges itself into the Anio.

DIGERI, a people of Thrace. Steph. Byz.

DIGES, in *Geography*, a small town of France, in the department of the Charente; six miles north-west of Tonnere.

DIGEST, DIGESTUM, a collection of the Roman laws, ranged and digested under proper titles, by order of the emperor Justinian. For an account of the manner in which this work was executed, see CIVIL *Law*.

To this the emperor gave the force of a law, by a letter at the head of the work, which serves it as a preface.

The digest makes the first part of the Roman law, and the first volume of the corpus, or body, of the civil law, contained in fifty books.

It was translated into Greek under the same emperor, and called Pandecta. See PANDECTS.

Cujas says, that digest is a common name for all books disposed in a good order and economy; and hence it is, that Tertullian calls the gospel of St. Luke a digest. He also calls the gospels, or the whole New Testament, our digest, in allusion, as it seems, to some collection of the Roman laws digested into order. He likewise calls the Jewish scriptures sacred digests; and he seems to use the word digest elsewhere, as equivalent to writing, or work in general. Adv. Marc. l. iv. c. 3. Apolog. c. 47. Ad Nation. l. ii. c. 1.

Hence also, abridgments of the common law are denominated digests of the numerous cases, arguments, readings, pleadings, &c. dispersed in the year-books, and other reports and books of law, reduced under proper heads or common places. The first was that of Statham, which comes as low as Henry VI. That of Fitzherbert was published in 1516; Brook's in 1573, of which Hughes's, published in 1663, is a sequel. Rolls, Danvers, and Nelson, have also published digests or abridgments of this kind, including the cases of later days; to which may be added the new abridgment, and Viner's abridgment.

DIGESTION, in *Physiology*, is that function, by which the substances taken for food, and submitted to the action of a peculiar system of organs, change their qualities, and form a new compound, fit for the purposes of nourishment and growth. Animals alone are provided with digestive organs; all of them, from man to the polype, possessing an alimentary cavity of various shapes and structure: the existence of a digestive apparatus may, therefore, be regarded as an essential character of animals, and as a point by which they are distinguished from the vegetable system.

One of the most striking phenomena observable in living bodies, is the constant motion of decomposition and composition, which is perpetually going on in all their parts. The solids and fluids are agitated by a perpetual movement, which is felt in every fibre and minute particle of the frame. A disunion of the constituent elements, an alteration of the substance, a dissolution of the whole mass would necessarily follow, were not the destructive effect of this motion compensated by an equivalent power of reproduction. The sensible and insensible perspiration, the pulmonary exhalation, the secretions of saliva, bile, and urine, the fluids and solids taken up in all parts by the absorbents, &c. &c. take off some pounds every day. The resistance, which the animal body opposes to all these means of decomposition, is founded on a series of reproductive efforts, which may be arranged under the three following heads; it prepares, changes, and converts into a nutritive fluid, the alimentary substances which are submitted to the action of its digestive organs. It purifies the nutritive fluid, and brings it to perfection by the new processes which that fluid is submitted to in the vascular system, and by the action of the secretory and excretory organs, which separate from it heterogeneous and noxious products. Lastly, it deposits the particles of this fluid in the internal texture of the organs by an action peculiar to each, while the superfluous portion passes into a peculiar system, whose office it is to collect it. Hence, the phenomena of assimilation are comprehended under three classes of functions; 1st, digestion and chylification; 2d, sanguification and secretion; 3d, nutrition and absorption; of which the first only are the object of the present article. The term digestion is often applied, in a more limited sense, to the change which our food undergoes in the stomach only: here, however, we shall lay before the reader a view of the changes wrought upon the food in the whole of its passage through the alimentary canal, preceded by an account of hunger and thirst, and of the substances employed for food.

The digestive apparatus of the human subject consists of a long canal extending from the mouth to the anus; in which open the excretory ducts of various glandular bodies placed in its vicinity, and secreting liquors which alter, dilute, and animalize the alimentary substance. The different portions of the digestive tube do not possess the same dimensions; expanded in the mouth and pharynx, it contracts considerably in the œsophagus; the latter, greatly enlarged, forms the stomach, which, again contracted, is continued under the name of the intestinal tube. The last-mentioned canal presents a very different diameter in its various portions; and these diversities of magnitude have given rise to the chief anatomical divisions. The digestive tube is five or six times the length of the whole body in an adult; it is proportionally longer in the infant, since digestion is more active at that age from the greater necessity of growth and reparation. But we must not enter into any further anatomical details in the present article, which is purely physiological. The organs, which prepare the food for the action of the stomach, and the whole history of its preparation, will be found under DEGLUTITION; the rest of the alimentary tube and its appendages will be described under the articles STOMACH, INTESTINES, LIVER, PANCREAS, and SPLEEN.

The length of the digestive tube holds a relation to the nature of the food, on which the animal subsists. The greater the difference between the alimentary matters and the substance of the body, the longer must they be retained, in order to undergo the requisite changes. Thus, we discover, in herbivorous animals, a very long intestine, with a large,

large, and often complicated ſtomach : while the carnivorous tribes have a ſhort and ſmall digeſtive canal, conſtructed in ſuch a manner as to afford a rapid paſſage to their animal food, which contains more nouriſhment under a ſmaller bulk, which is digeſted more eaſily and readily, and might have putrefied if detained too long. In this point of view, man holds a middle rank between thoſe ſpecies which eat vegetable food, and thoſe which ſubſiſt on fleſh ; he is adapted for both thoſe kinds of nouriſhment, and is not excluſively herbivorous or carnivorous, but, by the very nature of his frame, *omnivorous*. This queſtion, which is ſo eaſy of ſolution, has often occupied the attention of the phyſician, naturaliſt, and philoſopher, who have derived tolerably plauſible arguments on both ſides, from the form and number of the teeth, ſtructure of the inteſtines, &c. We have already ſhewn, in the deſcription of the teeth under the article CRANIUM, that their form, &c. would lead to the ſame concluſion, as we have now pointed out.

Hunger and Thirſt.

The want of food ariſes from the neceſſity of obviating the loſſes which our body is conſtantly ſuffering, in the performance of its various functions ; and of preventing, by the reparation of theſe loſſes, the fatal effects which they would otherwiſe occaſion. It is announced in all animals by an active and imperious feeling, which we call hunger, when it regards ſolid food ; thirſt, when its object is liquids. Animal life could not be continued to the term allotted by the Creator without a conſtant ſupply of nutriment ; we are incited to take this by the pleaſure attendant on the gratification of our natural wants ; which pleaſure is always increaſed in proportion to the neceſſity of gratifying them. The appetite of the luxurious glutton can hardly be rouſed by the ſpices of either India ; while the ploughman or hunter, returning from his daily labour, finds a reliſh in the coarſeſt bread, and ſimpleſt drink, that might be envied by the pampered palate of the epicure. But man and animals, who ſeem naturally prone to inactivity, and averſe from labour, are not governed, in this reſpect, by pleaſure alone : they are rouſed by the loud and repeated admonitions of an urgent, terrible, and, at laſt, intolerably painful ſenſation, to exert themſelves and labour for the acquiſition of food and drink.

Theſe wants are more urgent in the early periods of life, when, beſides the reparation of daily loſſes, materials of growth muſt alſo be ſupplied. Hence, the nutritive phenomena, and, conſequently, the digeſtive functions, are more active, as long as the body continues growing. The admonitions of hunger are alſo more preſſing in robuſt individuals who are engaged in laborious exertions, eſpecially in the open air, and who, conſequently, experience a greater daily loſs. Labouring men, like children, take daily four meals, or more, and thoſe plentiful ones. Fatigue diſſipates in the former what is applied to purpoſes of growth in the latter.

Habit conſiderably modifies our feelings in regard to food. The periodical returns of hunger at the arbitrarily fixed periods of our meals; and the loſs of appetite experienced when the accuſtomed time has gone by without our having taken a meal, ſtrongly illuſtrate this. Hence ſome have drawn a diſtinction between hunger and appetite, conſidering the former as the natural expreſſion of a real want; the latter as the habitual reſult of an artificial deſire. The laſt is conſiderably influenced by the imagination and the will. The recollection of a diſguſting object will often diſſipate the appetite, and even change it into an averſion from food : profound meditation, agreeable amuſements, or ſtrong paſſions, deaden our ſenſe of hunger, and render us for a time inſenſible to its effects.

A want of food produces a diminution in the weight of the body, which is already very ſenſible at the expiration of twenty-four hours ; emaciation from the general abſorption of the adipous ſubſtance ; coldneſs ; proſtration of ſtrength ; and the moſt painful dragging ſenſation at the pit of the ſtomach. It has alſo been aſſerted that the blood and other fluids degenerate, become alkaline, acrid, and even putrid ; that the blood-veſſels and nerves are eroded, and hence that hemorrhages enſue, &c. But we believe that theſe circumſtances are not drawn from obſervation, and that no ſuch changes enſue.

A healthy adult certainly could not abſtain from food for twenty-four hours without feeling very conſiderable weakneſs ; and, if the abſtinence were continued for eight days, death would be the highly probable event. Indeed in many inſtances a ſhorter period has ſufficed. Generally ſpeaking, the fatal event approaches more rapidly in proportion to the youth and ſtrength of the ſubject. Thus count Ugolino, (whoſe dreadful fate has been immortalized by Dante) condemned to periſh by hunger, and ſhut up with his children in a dungeon, died the laſt on the eighth day, after ſeeing his four ſons periſh ſucceſſively amid the convulſions of rage and the cries of deſpair, victims of the moſt horrible vengeance recorded in the annals of human crimes.

Yet numerous inſtances have occurred, in which, contrary to the accuſtomed courſe, abſtinence has been ſuſtained for much longer periods; for weeks, months, and even, if the narratives may be credited, years. Haller has collected a long liſt of ſuch examples, (Elem. Phyſiol. lib. 19, ſect. 2.) and if all of them ſhould not be authentic, there is yet a ſufficient number of well atteſted facts to ſhew, that perſons, under certain circumſtances, can diſpenſe with food for a long time. In Duncan's Annals, vol. 4. is the account of a woman who ſurvived after being buried in ſnow for eight days ; the ſenſation of hunger ceaſed after the firſt day. Thirſt was the predominant feeling, and it was alleviated by ſucking the ſurrounding ſnow. In the 5th vol. of the ſame work, is the account of a lunatic who would often abſtain from all food both ſolid and liquid for fourteen days without appearing to be much weakened by it. In the medical communications, Dr. Willan has mentioned a young man, who, having taken up ſome ſtrange religious notions, lived for ſixty days on a pint of water ſlightly flavoured with orange juice each day. Dr. Birch, in his Hiſtory of the Royal Society, vol. ii. ſpeaks of Johanna Naunton, a young lady of noble extraction, reduced to indigence, who abſtained from food to conceal her poverty, and ſupported herſelf on lemon juice for 78 days. Haller mentions an inſtance of one, and another of three years abſtinence, as particularly authentic and well aſcertained. Elem. Phyſiol. tom. vi. p. 171.

In explanation of theſe facts, we may obſerve, that moſt of the ſubjects were weak and delicate women, living in a ſtate of complete inaction; many of them almoſt inſenſible, ſtupid, and lethargic. The men in every inſtance were melancholic. In ſuch ſubjects, the organs were not ſenſible to the natural ſtimuli, and the cuſtomary loſſes of the body in perſpiration, ſweat, &c. were not obſerved : the exiſtence of life almoſt extinct was only proved by a pulſe hardly to be felt, and a reſpiration ſcarcely perceptible performed at long intervals. Such individuals may be compared to hybernating animals ; where the pulſe and reſpiration are equally obſcure, where no food is taken, and conſequently no fœces are voided, &c. In many inſtances of abſtinence, water was freely taken, which would undoubtedly obviate many of the ills ariſing from hunger.

The

The fymptoms of hunger are, firft an unpleafant fenfation, and then a very peculiar dragging and lacerating pain in the ftomach; increafed fenfibility, want of fleep; debility, yawning and fainting. The pain remits but returns with increafed violence; the mind becomes affected, and delirium or mania clofes the fcene. So dreadfully painful are the fenfations experienced from a privation of food, that they overcome the moft violent antipathies, and the deareft affections. Bones, putrid meats, hides of animals, leather, in fhort the moft difgufting fubftances, are greedily devoured. The rage of the fufferer has fometimes attacked his own fpecies, his friends, his children, and even the fubftance of his own body. The ftomach, during abftinence, becomes very much contracted; and hence we can underftand, how a very fudden diftention of the organ, in this ftate, fhould caufe pain, fainting, illnefs, or even death. Hence the neceffity of allowing a very fmall quantity of food to perfons in this condition; and of proportioning our fupplies not to what the appetite demands, but to what the ftomach will bear.

A cafe is recorded in Dr. Currie's Reports, of a patient who died of inanition from ftricture of the œfophagus; of which we juft mention the heads, confidering it valuable from the rarenefs of fuch records, and the philofophic accuracy of the obferver. From the 17th of Oct. to Dec. 6, he was fupported without the aid of the ftomach, by means of broth clyfters, and was immerfed in a bath of milk and water; thefe circumftances, would, no doubt, modify the fymptoms. He had at one time a parched mouth; a blifter difcharged only a thick coagulable lymph; and the urine was fcanty, extremely high coloured, and intolerably pungent. This want of aqueous parts in the fluids, is, no doubt, the circumftance, which has given rife to the notion of their acrimony. The heat was natural and nearly uniform from firft to laft; the pulfe was perfectly natural until the laft days. His fleep was found and refrefhing; his fpirits even, and his intellect perfect until the four laft days, when the clyfters were no longer retained. Vifion was deranged on the firft of December, and delirium followed on the next day; yet the retina was unufually fenfible, and the fenfe of touch remarkably acute. The furface and extremities were fometimes of a burning heat, fometimes clammy and cold. On the fourth the pulfe became feeble and irregular, and refpiration laborious; and in ninety-fix hours after all means of nutrition, as well as all medicine had been abandoned, he ceafed to breathe. He was never much troubled by hunger; thirft was at firft troublefome, but relieved by the tepid bath. Currie's Reports, vol. i.

Many circumftances have been adduced to explain the proximate caufe of hunger; *viz.* the friction of the coats of the empty ftomach againft each other; the irritation produced on its furface by the action of the accumulated gaftric juice; the contraction of its mufcular fibres; the compreffion and folding of the nerves from this contraction; and the dragging of the liver and fpleen on the diaphragm, when they are no longer fupported by the ftomach and inteftines on account of their empty ftate. It would be a wafte of time to comment on the infufficiency of thefe explanations. A more rational illuftration confiders hunger as a fenfation, excited in the ftomach by fympathy with the wants of the conftitution at large. For if any circumftance impedes the nutrition of the body, hunger ftill remains, although the ftomach be diftended. This happens in fchirrous pylorus, where the nutritive mafs cannot pafs into the fmall inteftine, to be fubjected to the action of the lacteals, where the loffes of the body cannot therefore be repaired. In difeafed mefenteric glands the fame phenomenon is noticed; *viz.* voracious hunger in fpite of the quantity of food taken. In both thefe inftances, we fee how ineffectual all the above mentioned caufes would be in explaining the feat of hunger; and again, in the cafe quoted from Dr. Currie, hunger was not felt, although the ftomach continued empty for fo long a time. That hunger is a nervous fenfation of the ftomach feems probable, from its being influenced, like all the phenomena dependent on nervous action, by habit, and by mental caufes; from its being increafed and excited by caufes which act on the fenfibility of the organ, as by fpirituous drinks and fpices, even when the ftomach is filled; and by its being diminifhed by means of the contrary kind, as we know that opium will act in deadening the acute feelings of hunger, and that the Turkifh and Indian fanatics, called Mollahs and Faquirs, are enabled, by this means, to fupport their long fafts.

Thirft is a feeling of a ftill more urgent kind, and requiring inftant fatisfaction ftill more imperioufly than hunger; particularly when it is felt in a hot climate. Its effects are depicted in the account of the horrible fufferings experienced by our countrymen in the black hole at Calcutta, when, however, the great mortality may not be afcribable to thirft alone. According to the relation of Plutarch, Lyfimachus, one of the braveft fucceffors of Alexander, was compelled to furrender with his army, from the want of water; and Paul Jovius relates that the emperor Charles V. loft feveral men in his African expedition from the fame caufe. Thirft becomes very urgent when any of the watery fecretions are augmented, as in dropfy and diabetes; and it is one of the moft diftreffing fymptoms in fevers, and inflammatory complaints, particularly inflammation of the ftomach. Hot fpices, faline fubftances, and particularly common falt, encreafe it, as do all caufes augmenting the different fecretions. Hence it fhould feem that the end of drinking, is to repair the loffes of our fluids.

The feat of thirft is in the mouth and fauces; which parts are not lubricated by the ufual fecretion, and confequently become dry. If it be not fatisfied, a general irritation comes on, the fenfation of drynefs increafes, and is accompanied with a burning feel, and an acute fever enfues. Thefe fymptoms do not ceafe until a fupply of fluid, conveyed into the ftomach, reftores the fecretions of the mouth and throat. Yet, although thirft at firft appears fo urgent, drink is by no means fo neceffary to the continuation of life, as food. Several fpecies of warm-blooded animals, as mice, quails, parrots, &c. can fubfift without drinking; and individuals of our own fpecies have, in fome inftances, by perfeverance, conquered the fenfation of thirft. Sir G. Baker has recorded a moft memorable example in the Tranfactions of the College of Phyficians, of a man who lived in perfect health for many years without drinking.

Food. Every thing that can afford nourifhment to an animal body muft have previoufly poffeffed life, and confequently all food is derived from either the animal or vegetable kingdom. Minerals ferve for feafoning and medicine; and fome miferable favages have appeafed the feeling of hunger by taking a greafy kind of earth into the ftomach. Some of the lower animals, as the earth-worm, alfo fwallow earth; but they may extract vegetable and animal remains from this without deriving nourifhment from the earth itfelf.

Any thing which is analagous to the nature of the body to be nourifhed, and is fufceptible of being changed into its fubftance, may conftitute an article of food. The effential characters of alimentary fubftances are, that they will eafily change their nature and properties; that they yield readily to the means of decompofition applied to them; diffolve eafily in water; and are fubject to that fpontaneous motion which conftitutes fermentation. The fubftances which unite

these properties muſt alſo be of a compound nature, that is, muſt conſiſt of ſeveral elements, otherwiſe they would be incapable of the neceſſary decompoſition: they muſt alſo have already experienced ſome alteration; and hence the utility of the preliminary action of the organs of maſtication and inſalivation.

The food of man takes in almoſt every variety of both animal and vegetable ſubſtances. It conſiſts therefore of ſeveral unchangeable principles, foreign to the buſineſs of nutrition, combined with others in which the nutritive power reſides. The latter varies in its characters and proportions. Mucilage, gelatine, gluten, albumen, fecula, fibrine, ſugar, and the baſe of oxalic acid, are the general modifications under which the nutritive ſubſtance preſents itſelf. Each of theſe varies according to the nature of the heterogeneous principles with which it is aſſociated.

In the numerous plants which do actually, or which might ſerve for food, mucilage ſometimes exiſts alone, or mingled with extractive, colouring, acrid, bitter or odorous matters; or diluted with various proportions of water. It is often united with oxalic acid and ſugar; ſometimes with a very active volatile principle of a very acrid taſte and penetrating odour. Laſtly, it furniſhes the matter of gums and vegetable jellies; in one of which the nutritive principle is imperfectly formed, while in the other it is brought into a very ſmall volume.

Gum tragacanth, ſeneca, cherry-gum, &c. are examples of this matter. It is no where cultivated, nor even collected for food; ſo that we might be apt to conſider it as incapable of affording any nouriſhment, if it were not known that the caravans croſſing the ſandy deſerts of Africa, over which they have brought gum ſeneca, have in many inſtances loſt their way, exhauſted their proviſions, and been obliged to live on this gum for many weeks, having nothing elſe but water alone, and a very ſparing ſupply of that. Mucilage is alſo contained in moſt vegetable juices, and in the ſtems and other parts of plants.

In the fleſh of animals which we uſe for food, the gelatine is united with fibrous, extractive, ſaline, and earthy particles. It is mingled with fat, and with ſerous or lymphatic fluids. It is found in various degrees of tenacity and conſiſtence; in which it determines all the ſenſible differences of the white organs, which contain an abundance of gelatine. In a word, it forms the animal jellies, which conſtitute a mild, light, and wholeſome food.

Vegetable gluten is always found combined with other ſubſtances ſoluble in water, without which it could not be diſſolved in, and blended with, our juices. It abounds in the gramina, where it is united with fecula, extractive principle, colouring matter, mucilage, and an earthy ſubſtance.

The albumen of animal matters reſembles, in many points, the vegetable gluten. The whole white, and a great part of the yolk of an egg, are a compoſition of albumen, and colouring, and oily principles. The caſeous matter of milk is a modification of albumen; which, together with the principles of butter and ſugar, compoſes that ſoft emulſive liquor, ſo favourable to the conſtitution of infancy. The moſt nutritive plants are thoſe whoſe baſe and prevailing principle is the amylaceous fecula. It exiſts ſometimes completely pure, and free from extraneous admixture; ſometimes united with mucilage, oils, or gluten; ſometimes with ſugar, extractive, or colouring matters; ſometimes with earthy, acid, or ſaline principles; and very rarely with noxious, or poiſonous matters. Wheat is compoſed of gelatinous matter and fecula. Theſe two principles, acted on by the fermentative proceſs, form bread, the nutritive qualities of which are not ſurpaſſed by any ſubſtance. It is ſo much the more proper for animalization, inaſmuch as the fermentation has already brought it into a ſtate fit for decompoſition.

The principle now alluded to, which conſtitutes the farinaceous matter of vegetables, is contained, perhaps, in the largeſt proportion in rice; and wheat is the next to this. Other grains are only ſubſtitutes for theſe; except maize, which is eaſily cultivated, and contains much farinaceous matter. The legumina contain much of the ſame principle; as alſo nuts, and the ſeeds of the cucurbitaceæ and poppy, although not uſed for food. It exiſts, probably, in the ſtems of ſome plants, as the palmæ, from the expreſſed juice of which ſago is formed; in the roots of many claſſes, as the potatoe, yam, and pignut, in which it is very abundant.

The fibrine of the muſcles and blood partakes of the properties of gluten and fecula: it admits of a very ſpeedy aſſimilation, and exerts a more marked, rapid and extenſive influence on the ſtrength in general than any other food; yet it reſiſts the digeſtive powers, when, deprived of gelatine or dried, it is reduced to a hard coriaceous ſubſtance. It forms a cloſe and firm, but delicate and diviſible texture, in the muſcles of healthy animals, which form a light and ſucculent kind of food. An extractive colouring matter generally adheres to the fibrous ſubſtance; and the differences in its quantity or quality influence the appearance and nutritive powers of our various animal foods.

Sugar, and the oxalic baſe, which can hardly be ſeparated from it, are produced by both kingdoms. The vegetable acids are convertible into a ſugary ſubſtance, which beſtows on them whatever nutritive powers they may poſſeſs. Other acids, beſide the oxalic, are unfit for nouriſhment; and they only acquire that property by an admixture of the latter or of ſugar or mucilage. The ſame principles exiſt in various proportions in the fruits employed for food. The reſpective quantities of mucilage, ſugar, acid, and water, indicate how far they are ſuſceptible of digeſtion, and, conſequently, nouriſhing.

Sugar exiſts in moſt vegetables, but is moſt abundant in the ſugar-cane, from which alone it is furniſhed to any great amount, in the ſugar-maple and the beet-root. Excepting what is ſupplied from the vegetables above-mentioned, and which hardly forms the food of any perſon, its ſources for the purpoſes of food are not very general, being confined principally to dates, grapes, figs, and ſome other fruits. Fruits indeed, in general, contain ſugar; many of them in ſufficient quantity to afford conſiderable nouriſhment. But the three ſpecies juſt enumerated are thoſe on which many individuals live almoſt entirely; the ſugar being nearly their only nouriſhment: this obſervation holds with regard to dates in ſome of the African tribes, grapes in ſome parts of Portugal and Spain, and figs in Greece and the Grecian iſlands.

Expreſſed oils, found in vegetables, are alſo capable of being digeſted; the ſeeds containing them, and eſpecially nuts, are in many inſtances the principal food of the inhabitants of a country, as cocoa-nuts in America and the Eaſt. Theſe ſeeds indeed contain farinaceous matter, but in too ſmall proportion to afford nouriſhment of itſelf. The oily animal fluids alſo afford nouriſhment; the moſt common ſource of theſe is the fat of meat and butter, but there are perſons who drink with avidity ſpermaceti and train oil.

The ſmall number of principles juſt enumerated, as aſcertained by the reſearches of modern chemiſtry, fix the particular characters on which the natural diſtinctions of our aliments muſt reſt. The numerous modifications which theſe muſt undergo, from a variety of cauſes, will influence our choice of particular ſpecies of food; but theſe conſiderations,

as well as thofe which regard the quantity and proportions both of folid and liquid food, belong to the fubject of diætetics. See DIET.

The food of man, in the firft ages, feems to have been drawn from the vegetable kingdom; in thofe times, milk, derived firft from the breaft of the female, and afterwards from flocks and herds, was the fole nourifhment furnifhed by animals. Soon, however, flefh was added to the food, and the juice of the grape to the drink of the human fpecies. Subfequently the earth, air, and water, have been exhaufted to adminifter to the wants or luxury of mankind; and fubfiftence has been drawn indifferently from animal or vegetable fubftances.

The power of adopting all kinds of diet would naturally lead us to expect the differences which we actually find in this refpect among the numerous nations fcattered over the face of the earth. In the moft remote antiquity we read of tribes in Africa, and of the Indian priefts and philofophers, who lived only on vegetables; while the Ethiopians, Scythians, and Arabians, ate nothing but flefh or animal food. Some tribes on the fea-coaft fubfifted entirely on fifh. Modern hiftory difcovers the fame difference of regimen. A vegetable diet feems fuitable to the burning countries under the equator, and we, accordingly, find nations there who have completely adopted it, and who abftain fo much the more feverely from all animal foods, inafmuch as it is an article of their religious faith. It is alfo rigoroufly obferved in fome more temperate climates. Potatoes, chefnuts, maize, and the legumina, fatisfy the wants of the Alpine peafant; and numerous inftances might be quoted of individuals and tribes whofe fole food has been vegetables and water. The frozen regions of the north demand a different diet; and the animal kingdom fupplies the food of man near the pole. In the north of Europe, where the cold is lefs rigorous, the Swede, Dane, Ruffian, German, and Englifhman, eat much meat and little vegetables. The Tartars in Afia, and entire tribes of favages in North America, live on raw and half putrid meat. The herbivorous animals afford the beft animal food; but the Tartars, Samoieds, Efquimaux, and others, do not refufe food derived from other claffes.

The mufcles of the herbivora are moderately foft and contain much gelatine; their milk is mild, the urine and fœces not very fœtid. Befides the cow and fheep, which are almoft our only fupply, the horfe, afs, camel, and goat, are ufed in other regions. The flefh of the carnivora is harder, and peculiarly ftrong and fœtid. Yet dogs were eaten in the time of Hippocrates, and ftill by feveral favage tribes; and the feal and walrus have often yielded a fupply to the failor. All the granivorous, herbivorous, and infectivorous birds, are eaten; the carnivorous very rarely; and the pifcivorous never, except in the laft neceffity, on account of their difgufting fmell and tafte. Fifhes fupply an abundant fource of aliment, and even reptiles and infects are employed in fome inftances.

The miferable inhabitants of New Holland lived wholly on fifh when that country was firft difcovered; and the fame circumftance may be affirmed of various tribes on the fhores of Arabia and the Perfian gulph. In the iflands towards the North of Scotland a great part of the food arifes from the fame fource; ftill more in the Ferro iflands, in Iceland, and Lapland; and the whole in Greenland, and in the neighbourhood of the mouths of the large ftreams in the north of Afia. This clafs has alfo fupplied fome very fingular kinds of aliment: the roes of the fturgeon, beluga, and carp, bruifed, falted, dried, and immerfed in oil, form the Ruffian delicacy named caviar; this, and a fimilar preparation from other fifhes, were eaten in great quantities by the adherents of the Greek church, although Tournefort thought them deteftable. The Roman luxury garum, which bore fo high a price, confifted of the putrid entrails of fifhes (firft of the garus only) mixed with wine; and a fimilar preparation is ftill eaten in fome parts of the eaft. After this we fhall not be furprifed at hearing that the Arabs, Moors, Californians, and Ethiopians, eat locufts; and that toads, grafshoppers, fcorpions, and fpiders, have ferved for the food of man.

The affertion that all vegetable matters will ferve us for food, muft be taken with fome limitation: for, befides the poifonous and medicinal productions of this kingdom, the fibrous and membranous parts of vegetables are clearly not digefted, let them be ever fo tender and foft. They are, however, digefted by fome other animals; but every man knows, from his own obfervation, that the fkin of grapes or raifins, &c. paffes unchanged through the inteftines. Oats will ftill retain their power of germination, after going through the alimentary tube in horfes, if the hufk be not broken before they enter the ftomach. Neither are all animal matters digeftible; this is the cafe with cuticle, hair, horn, feathers, &c. which, accordingly, are thrown up in balls from the ftomach of birds of prey. The indigeftible nature of thefe matters probably arifes from their being inorganic, or deftitute of living powers.

It may alfo be mentioned as a curious fact, that the poifonous juices of feveral animals, which, when infufed into a wound, prove almoft inftantly fatal, may neverthelefs be taken into the ftomach, not only of many other animals, but even of the human fubject, without the fmalleft detriment. Dr. Fordyce knew the black fervant of an Indian merchant in America who was fond of foup made of rattle-fnakes, in which he always boiled the head along with the reft of the animal, without any regard to the poifon. It has alfo been afcertained, that the deadly ticunas, with which the American arrows are poifoned, may be taken into the ftomach with impunity. Neither are the animal or vegetable poifons fo effentially injurious to life as to exert their deleterious effects invariably. The conium maculatum, which is highly poifonous to man, is taken in abundance, without injury, by goats: feveral other poifonous vegetable productions are eaten by birds; and the cantharides are devoured by two kinds of infect, whofe juices are, neverthelefs, perfectly mild.

Since man is diftinguifhed beyond all animals by the power of living in the moft diftant parts of the globe, under every variety of climate which this earth affords, his food could not be derived exclufively from either kingdom, fince he inhabits regions that afford aliments only of one or the other fort. He claims more juftly than any other the title of an omnivorous animal; becaufe, on the one hand, he can revel in the vaft variety of aliments drawn from the endlefs ftores of the animal and vegetable kingdoms; while, on the other fide, he can live healthy and ftrong on a fingle, and that the moft fimple form of food. Thus, in modern times, numerous examples occur of perfons living entirely on potatoes, chefnuts, dates, &c. Some wandering Moors are confined almoft entirely to gum Senegal (Mem. de l'Acad. des Sc. 1778.) The Kamtfchatkans, and other inhabitants of the fea-fhore, fubfift wholly on fifh; the fhepherds, in the province of Caraccas, on the Oronoko, entirely on flefh. Some barbarous tribes eat their meat raw.

Since, then, it appears that the ftructure of the teeth, the joint of the lower jaw, and the form and ftructure of the ftomach and inteftines, hold a middle rank, in the human fubject, between the carnivorous and herbivorous; and that men have actually fubfifted in full health and ftrength on one or the other kind only, or on a mixture of both forts of food, the conclufion that he is naturally defigned to be omnivorous follows neceffarily. We are the more difpofed to wonder

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that this ſhould have been at all conteſted, when we find that ſeveral other animals are by no means ſo ſtrictly confined to one ſort of food, as not to derive a ſufficient nouriſhment from the other ſpecies; not to mention the numerous examples of omnivorous quadrupeds and birds; cows, horſes, and ſheep have been nouriſhed on fiſh and fleſh, fowls on animal food; and cats and dogs have learned to eat vegetables: and if we reflect, moreover, that thoſe animals which form the food of the carnivorous ſpecies are fed on vegetables, theſe circumſtances will admit of eaſy explanation.

Man has not been able to introduce ſo great a variety into his drink as into his ſolid food. Water alone, perhaps, ſupplies nine tenths of the human race; and as this ſeems prepared for us by the hand of nature, as all animals employ it, and it exceeds all other drinks in its properties as a diluent and ſolvent, we cannot doubt that it is the moſt wholeſome beverage: whether it is to be regarded merely as a diluent, or whether it be nouriſhing in itſelf, ſeems a matter of doubt; although there is little queſtion that life would be prolonged with the uſe of water beyond the period at which it would ceaſe without any food or drink. The fact, which has been proved by the experiments of Fordyce, that gold-fiſh will increaſe in weight in pure diſtilled water, and void fœces, ſeems deciſive in proving that thoſe animals are nouriſhed by it, and there can be no doubt that it affords nouriſhment to vegetables alſo. In almoſt all parts of the globe ſome fermented liquor has been prepared, poſſeſſing the power of inebriation by the alcohol which it contains; yet, undoubtedly, affording a certain portion of nouriſhment.

Some ſingular circumſtances have alſo been obſerved concerning drink. Several iſlands between the tropics, particularly in the Pacific ocean, have no freſh water; and its place is ſupplied by the milk of the cocoa-nut. Others drink ſea-water. An inſtance occurs, in the eſſays of the Edinburgh Medical Society, of a woman who lived for fifty years on whey only.

Digeſtion. The aliment introduced into the ſtomach accumulates there, and ſeparates the parietes of the organ, which are always contiguous in its empty ſtate. Here the ſtomach yields to the mechanical diſtenſion without reacting. Yet it ſeems not to be entirely paſſive; or, at leaſt, its coats apply themſelves by a kind of tonic movement to the accumulating matter. As the quantity of food increaſes, the greater curvature of the ſtomach advances forwards. Although this organ has been regarded in all times as the chief inſtrument of digeſtion, it ſeems, in fact, to perform only a preparatory office; and not to accompliſh the grand and eſſential phenomenon of this function, namely, the ſeparation of the nutritive and excrementitious parts of the aliment. Yet the food in its cavity is prepared for that ſeparation; it is rendered more fluid, it experiences a great alteration, and is converted into a ſoft homogeneous pap, called *chyme.* Since the latter ſubſtance poſſeſſes new properties, it is evident that the food has undergone ſome changes in the ſtomach, and that the ingredients of which it was compoſed, have entered into new combinations. What then is the agent of this converſion? In other words, what is the action of the ſtomach on the food?

Various hypotheſes have been framed in order to anſwer this queſtion. The father of medicine, and the ancients in general, conſidered digeſtion as effected by *coction.* They did not by this term mean to deſignate any change ſimilar to that which ſubſtances experience when boiled: the temperature of the ſtomach is manifeſtly inadequate to the effect. Moreover, cold blooded animals digeſt as well as thoſe with warm blood; and the heat of fever, inſtead of invigorating, entirely deſtroys the digeſtive power. Coction, in the language of the ancients, means the alteration, maturation, and animalization of the food in the ſtomach. It is clear that the natural warmth of the part aſſiſts and facilitates theſe changes. Spallanzani's experiments on artificial digeſtion ſhew that the gaſtric juice has no more effect than common water in ſoftening and diſſolving the food, when the temperature is below 21°: on the contrary, that its agency is very conſiderable, when the mercury riſes to 30 and upwards above the freezing point. In cold blooded animals the proceſs is always much ſlower than in the warm blooded.

The authors and partiſans of the ſyſtem of *fermentation* have recognized in the food, when received into the ſtomach, a ſpontaneous inteſtine motion; by virtue of which, it paſſes into a new order of combinations. As we accelerate the fermentative proceſs, by adding to thoſe ſubſtances which are undergoing it, a portion of the ſame matter that has already fermented, ſome have ſuppoſed a ſort of leaven conſtantly exiſting in the ſtomach, formed by a ſubtle acid, or conſiſting of a ſmall portion of food remaining behind from the preceding digeſtion. The nature and cauſes of fermentation were imperfectly underſtood when this explanation was adopted. "All that could be meant, ſays Dr. Thomſon, by ſaying, that the converſion of food into chyme in the ſtomach is owing to fermentation, was merely that the unknown cauſe, which acted during the converſion of vegetable ſubſtances into wine or acid, or during their putrefaction, acted alſo during the converſion of the food into chyme, and that the reſult in both inſtances was preciſely the ſame. Accordingly, the advocates for this opinion attempted to prove that air was conſtantly generated in the ſtomach, and that an acid was conſtantly produced; for it was the vinous and acetous fermentations which were aſſigned by the greater number of phyſiologiſts as the cauſe of the formation of chyme. Some, indeed, attempted to prove that it was produced by the putrefactive fermentation; but their number was inconſiderable, compared with thoſe who adopted the other opinion.

"Our ideas reſpecting fermentation are now ſomewhat more preciſe: it ſignifies a ſlow decompoſition, which takes place when certain animal or vegetable ſubſtances are mixed together at a given temperature, and the conſequent production of particular compounds. If, therefore, the converſion of the food into chyme be owing to fermentation, it muſt evidently be totally independent of the ſtomach, any further than as it ſupplies temperature; and the food would be converted into chyme exactly in the ſame manner, if it were reduced to the ſame conſiſtence, and placed in the ſame temperature out of the body. But this is by no means the caſe; ſubſtances are reduced to the ſtate of chyme in a ſhort time in the ſtomach, which would remain unaltered for weeks in the ſame temperature out of the body. This is the caſe with bones; which the experiments of Stevens and Spallanzani have ſhewn to be ſoon digeſted in the ſtomach of the dog. Further, if the converſion of the food into chyme were owing to fermentation, it ought to go on equally well in the ſtomach and œſophagus. Now, it was obſerved long ago by Ray and Boyle, that when voracious fiſhes had ſwallowed animals too large to be contained in the ſtomach, that part only which was in the ſtomach was converted into chyme, while that which was in the œſophagus remained entire.

If, too, the converſion were owing to fermentation, it ought always to take place equally well, provided the temperature be the ſame, whether the ſtomach be in a healthy ſtate or not. But it is well known that this is not the caſe. The formation of chyme depends very much on the ſtate of the ſtomach. When that organ is diſeaſed, digeſtion is conſtantly ill performed. In theſe caſes, indeed, fermentation ſometimes

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appears, and produces flatulence, acid eructations, &c. which are the well-known symptoms of indigestion. These facts, which have been long known, are incompatible with the supposition that the formation of chyle is owing to fermentation; accordingly, that opinion has been for some time abandoned, by all those at least who have taken the trouble to examine the subject."

With as little reason has digestion been considered a species of putrefaction, or spontaneous change of the animal and vegetable food. Not to mention that digestion never exhibits any appearance of ammoniacal products, which are the most striking results of putrefaction, we shall find that the digestive organs have the power of restoring putrid meats to a sound state, or at least of arresting the putrefaction of substances submitted to their action. Serpents are enabled, by the great dilatability of their œsophagus, and the wide separation of their equally moveable jaws, to swallow animals larger than themselves. Several days are consumed in digesting these; and, during the process, that part of the animal which is submitted to the action of the stomach, is perfectly sweet, and in a more or less advanced state of dissolution, while the portion in the œsophagus presents appearances of commencing putrefaction. In spite of the heat and moisture of the part, the aliment does not stay long enough in the stomach for putrefaction to commence. Moreover, Spallanzani, Hunter, and other physiologists, have found that putrid flesh, when taken accidentally, or given purposely to animals, lost its putrid characters in the stomach, previously to its digestion.

Fermentation was the system of the chemists; trituration was that of the mathematical physiologists; who compared the changes effected on a substance in a mortar by the pestle of the apothecary, to those which the food undergoes in the stomach. But what analogy could ever have been conceived to exist between the forcible attrition of a substance against a resisting plane, and the gentle peristaltic motion of the fibres of the stomach? This opinion could have been held no longer, when it was perceived that chyme differed entirely from the food that had been taken; that is to say, that if the same food were triturated mechanically out of the body, and reduced to pap of precisely the same consistence with chyme, it would not possess the same properties with chyme. For, whenever this fact was known, it must be evident that the food had undergone changes in its composition. The fact that various fruits, as grapes, currants, raisins, &c. which are covered with a membranous coat, will pass through the intestines unchanged, if the covering be not broken in mastication, and that often, particularly in animals, slender worms remain unaltered in the stomach, shews that the food can experience only a very slight compressing force in its passage. But the direct experiments of Stevens, Reaumur, and Spallanzani, demonstrated that chyme is not owing to trituration; for, on enclosing different kinds of food in metallic tubes and balls full of holes, in such a manner as to screen them from the mechanical action of the stomach, they found that these substances, after having remained a sufficient time in the stomach, were converted into chyme, just as if they had not been enclosed in such tubes.

The mode in which digestion is effected in the gizzard of the gallinaceous birds, is the most plausible argument in favour of trituration. In them the food, after being macerated in the crop, descends into the gizzard, whose vast muscular strength enables it to supply the place of organs of mastication. (See the article Birds.) The trituration which it experiences here is aided by stones which the animal swallows; and its effects are truly surprising. Globes of glass or crystal are pulverized; bullets or metallic tubes are flattened, &c. These effects are analogous to those of mastication in the human subject; and the true digestion is completed by means of a fluid secreted in certain glands at the termination of the œsophagus. The wide difference of structure between these gizzards and the human stomach should have shewn the absurdity of applying inferences drawn from what happens in the one, to the other.

Pitcarne calculated the power of the stomach as equal to 12,951lbs.; and that of the diaphragm and abdominal muscles, which compress the stomach in the alternate motions of respiration, at 248,235lbs. What does such an absurd and exaggerated calculation shew, but that the vain apparatus of axioms, definitions, scholia, and corollaries, which have been introduced into works foreign to the nature of geometry, has only served to entrench vague, confused, and false notions behind imposing and respected forms? The introduction of the hand into the abdomen of a living animal, or of the finger into a wound of the stomach, is sufficient to shew that the force with which that organ acts on its contents does not exceed a few ounces.

The learned and laborious Haller supposed that the food was merely diluted and softened by the gastric juice; he conceived that this *maceration* was favoured and accelerated by the warmth of the part, by the commencement of putrefaction, and by the gentle, but continual motions, by which the aliment is agitated. Maceration surmounts at length the cohesive force of the most solid substances; but it never changes their nature, and cannot therefore be the agent of digestion. This opinion was chiefly formed on the analogy or ruminating animals; in whom the imperfectly masticated food is conveyed into an ample receptacle called the first stomach, or paunch, where it is truly macerated, and perhaps undergoes incipient fermentation. It is brought back from this cavity to the mouth to be again chewed, after which it descends into the second and third, and lastly into the fourth, or true digestive stomach. Here the whole structure is so totally different from that of the human subject, that we may justly protest against drawing any analogy between the two cases.

The formation of chyme, then, is owing to some peculiar process taking place in the stomach; and it has been concluded from the experiments of Stevens, Reaumur, Spallanzani, Scopoli, Brugnatelli, Carminati, and others, that its formation is brought about by the action of a particular liquid secreted by the stomach, and for that reason called *gastric juice*.

No organ perhaps receives a greater number of vessels, in proportion to its bulk, than the stomach; and hence we conclude, that this large supply is not merely designed for the nutrition of its substance, but also to furnish the materials of some secretion. The fluid thus formed is the gastric juice, which is probably poured out most abundantly when the presence of food in the stomach irritates that organ, and invites an afflux of blood from its numerous arterial tubes. It seems to be produced directly from the exhaling arteries, without any intermediate secretory apparatus. It is mingled with the mucus furnished by the glands of the villous coat, and thus it becomes viscous, like saliva, with which, on the whole, it has considerable analogy. It is extremely difficult to obtain it pure for the purposes of analysis; and even, if we could succeed in depriving the stomach of all residue of the food which might impair the purity of the gastric juice, we should not be able to prevent the admixture of a small portion of bile, which, entering at the pylorus, tinges the internal coat near that opening, and imparts a certain bitterness to the juices of the stomach.

Dr. Thomson, in his system of chemistry, seems to place very

very little reliance on the accuracy of the analyfes which have hitherto been made of the gaftric juice. "It is," fays he, "different in different animals, but it is a very difficult, if not an impoffible tafk, to obtain it in a ftate of purity. Various attempts have, indeed, been made by very ingenious philofophers to procure it; but their analyfis is fufficient to fhew us that they have never obtained it in a ftate of purity. The methods which have been adopted to procure gaftric juice, are, firft, to kill the animal whofe gaftric juice is to be examined, after it has fafted fome time. By this method Spallanzani collected 37 fpoonfuls from the two firft ftomachs of a fheep. It was of a green colour, undoubtedly owing to the grafs which the animal had eaten. He found alfo half a fpoonful in the ftomach of fome young crows, which he killed before they had left their neft.

Small tubes of metal, pierced with holes, and containing a dry fponge, have been fwallowed by animals; and when vomited up, the liquid imbibed by the fponge is fqueezed out. By this method Spallanzani collected 481 grains of gaftric juice from the ftomachs of five crows. A third method confifts in exciting vomiting in the morning, when the ftomach is without food. Spallanzani tried this method twice upon himfelf, and collected one of the times 1 oz. 32 gr. of liquid; but the pain was fo great, that he did not think proper to try the experiment a third time. Mr. Goffe, who could excite vomiting whenever he thought proper, by fwallowing air, has employed that method to collect gaftric juice. In any of thefe means it muft be contaminated by the admixture of faliva, mucus, bile, food, &c. It may, too, be queftioned, whether any gaftric juice at all can be obtained by thefe methods; for as the ufe of that fluid is to convert the food into chyme, in all probability it is only fecreted, when food is prefent.

According to Brugnatelli, the gaftric juice of carnivorous animals, as hawks, kites, &c. has an acid and refinous odour, is very bitter, and not at all watery; and is compofed of an uncombined acid, a refin, an animal fubftance, and a fmall quantity of muriate of foda. In herbivorous animals, on the contrary, as goats, fheep, &c. it is very watery, a little muddy, has a bitter faltifh tafte, and contains ammonia, an animal extract, and a pretty large quantity of muriate of foda. Carminati found the fame ingredients; but fuppofed that the ammonia had been formed by the putrefaction of a part of the food, and that the gaftric juice in thefe animals is therefore of an acid nature.

In man it has fometimes been found of an acid nature, at other times not. The experiments of Spallanzani fhew that this acidity is owing to the food. He never found any acidity in birds of prey, ferpents, frogs, or fifhes. Crows gave an acidulous gaftric juice only when fed on grain; and he obferved the fame fact in dogs, herbivorous animals, and domeftic fowls. Carnivorous birds threw up pieces of fhell and coral without alteration; but thefe fubftances were fenfibly diminifhed in the ftomachs of hens, even when enclofed in perforated tubes. Spallanzani fwallowed calcareous fubftances enclofed in tubes; and when he fed on vegetables and fruits, they were fometimes altered, and a little diminifhed in weight, juft as if they had been put into weak vinegar; but when he ufed only animal food, they came out untouched. According to this philofopher, whofe experiments have been by far the moft numerous, the gaftric juice is neither acid nor alkaline. When poured on the carbonate of potafh, it caufes no effervefcence.

The fame conclufion concerning the influence of the food on the nature of the gaftric juice, is rendered ftill more indifputable by the experiments of Dumas (Principe de Phyfiologie, tom. 4. ch. 9.) Having procured gaftric juice from a dog by means of fponge, in the mode employed by Spallanzani, he found that it did not change the vegetable blue; nor affect lime water; nor effervefce with alkalies. After feeding the animal with vegetables for fifteen days, the gaftric juice fhewed indifputable marks of acidity. A diet of animal food was now fubftituted in place of the vegetable, for the fame length of time, when inftead of marks of acidity, there were rather indications of an alkaline tendency. When a mixed diet was employed, no predominant quality appeared: the gaftric juice was faint, infipid, thick and vifcous.

With refpect to the fubftances contained in the ftomach, only two facts have been perfectly afcertained: the firft is, that the juice contained in the ftomach of oxen, calves, and fheep, invariably contains uncombined phofphoric acid, as Macquart and Vauquelin have demonftrated. The fecond, that the juice contained in the ftomach, and even the inner coat of the ftomach itfelf, has the property of coagulating milk and the ferum of the blood. Dr. Young found that feven grains of the inner coat of a calf's ftomach, infufed in water, gave a liquid which coagulated more than 100 ozs. of milk; that is to fay, more than 6857 times its own weight; and yet, in all probability, its weight was not much diminifhed.

What the fubftance is that poffeffes this coagulating property, has not yet been afcertained; but it is evidently not very foluble in water; for the infide of a calf's ftomach, after being fteeped in water for fix hours, and then well wafhed with water, ftill furnifhes a liquor, on infufion, which coagulates milk: and Dr. Young found that a piece of the inner coat of the ftomach, after being previoufly wafhed with water, and then with a diluted folution of carbonate of potafh, ftill afforded a liquid, which coagulated milk and ferum.

The moft remarkable property of gaftric juice, is the very fingular activity of its folvent power. The hardeft bones yield to its influence; and it acts as a real menftruum on thofe fwallowed by the dog, uniting with their organifed and gelatinous parts, and leaving a calcareous refidue, which is the material of thofe excrementitious concretions to which the older chemifts gave the ridiculous name of album Græcum. The folvent energy of this fluid is in an inverfe ratio to the mufcular ftrength of the coats of the ftomach; and where thefe are the thinneft and weakeft, it poffeffes the greateft force and activity. In the numerous clafs of zoophytes it is the fole agent of digeftion, as the food undergoes no preliminary preparation: this, indeed, is alfo the cafe in many other inftances. It is always more active when affifted by warmth, as Trembley obferved in the polype, which, according to his obfervations, digefted in twelve hours in the fummer, what occupied three days in colder times. In the actinea and holothuria it deftroys even the fhells of mufcles, which thofe animals fwallow. It attacks the furface of bodies, unites to the particles of them, which it carries off, and from which it cannot be feparated by filtration. It operates with more energy and rapidity, the more the food is divided. The aliment is not merely reduced to very minute parts; its tafte and fmell are quite changed; its fenfible properties are deftroyed, and it acquires new and very different ones. It does not act as a ferment; fo far from it, that it is a powerful antifeptic, and even reftores flefh already putrified. Only a few air bubbles make their efcape, which adhere to the alimentary matter, and buoy it up to the top, and are probably extricated by the heat of the folution.

However powerfully the gaftric juice may act in diffolving alimentary fubftances, it does not affect the coats of the ftomach itfelf; which probably owe their power of refiftance to their vitality. The lumbrici, which are very tender, are not

not affected for the fame reafon; yet, when the ftomach is dead, it yields, like other matter, to the gaftric juice, and in particular cafes becomes foftened, and partly deftroyed. This circumftance was firft noticed by Mr. Hunter, and the cafes in which it has happened are thofe of fudden deaths, where the perfon was previoufly in good health, and had lately eaten. In fome, confeffedly rare examples, a large hole has been found in the ftomach from this caufe, with the margins ragged and foft. As the facts mentioned by Mr. Hunter have been queftioned, the writer of this article can add one, in which he found the great end completely deftroyed in a child. In animals it is by no means rare to find the ftomach even very confiderably diffolved in this way; and we can eafily kill them under circumftances in which the effect is likely to take place. In the human fubject the great end of the ftomach will often be found pulpy and foft on its internal furface, although it be not actually diffolved through.

We have already noticed the coagulating power of the calf's ftomach: it is found that coagulable animal fluids, as milk or jelly, introduced into the ftomach, are coagulated before they are digefted. This fact is obvious with refpect to the milk vomited by fuckling children. They muft afterwards be diffolved like the more folid parts of the food.

The proof of the facts already ftated concerning the action of the gaftric juice, is derived from experiments, in which food enclofed in perforated tubes taken into the ftomach, and returned again by vomiting, has been completely changed into chyme. Spallanzani has repeated his refearches almoft unneceffarily on this point, in the various claffes of animals, and uniformly with the fame refult as to the performance of digeftion by a folvent fluid. Similar refearches have alfo been inftituted on the human fubject, with the fame event. It has been found, too, that digeftion could be imitated out of the body, by means of gaftric juice obtained in the methods explained above; that alimentary fubftances, expofed to its action in the temperature of the human body, were diffolved, while they remained unchanged in water under the fame circumftances.

Dr. Stevens met with a very favourable opportunity of afcertaining the action of the gaftric juice on fubftances enclofed in tubes and fwallowed, in a man who had the power of fwallowing ftones. Twenty-eight gr. of pork and cheefe were entirely diffolved, when the tubes were voided in 43 hours: the fame was afcertained of parfnip and potatoe, boiled falt, herring, and roaft turkey. Grain covered by its hufk, was unaltered: neither was bone affected. Leeches and earth-worms were completely diffolved. In the ftomach of a dog 3 fcruples 16 gr. of ivory loft 2 fcruples: and bone was fenfibly affected. Cartilage was not changed, nor fat fo much as lean.

The gaftric fluid then will exert its influence on the dead ftomach, and it will even act on alimentary matters out of the body. Yet we muft not completely identify thefe cafes with that of digeftion in the ftomach; we are not to regard that organ as a chemical veffel, in which decompofitions and recombinations are going on; we muft take into confideration the living powers of the part, and we fhall find, that the fecretion of gaftric juice is fubject to the influence of thefe, and that it requires the free and continued action of the nerves of the part. The ligature of the par vagum, the ufe of narcotics and opium, profound meditation, or violent emotions of the mind, will interrupt or fufpend digeftion. Dumas has performed feveral experiments on this fubject; he found the gaftric fecretion diminifhed by introducing opium into the ftomach, alfo by acids and alcohol; increafed by volatile alkali, emetic tartar, and corrofive fublimate; and interrupted or fufpended by caufes that affected the nervous fyftem in general, as violent pain. When the natural functions of the part were thus difordered, fermentation and putrefaction took place in the aliment. Indeed, the changes which the food undergoes in the ftomach, differ effentially from any which chemical means can produce; no artificial procefs can imitate the formation of chyme; no folution, analyfis, or combination, will ever enable the chemift to form or extract that nutritive fluid common to all animals, but poffeffing fpecific characters in each. Without, however, pretending to admit or to exclude the poffibility of bringing, one day or other, the converfion of aliment into the nutritive fluid, under the general laws of chemiftry, we may at leaft note certain circumftances which belong inconteftibly to vital phenomena. 1ft. Digeftion varies according to the nature and difpofition of the animal in which it is performed, a circumftance contrary to the uniformity of chemical refults. 2dly. It varies according to individual peculiarities, one perfon digefting well what would difagree with another, &c. 3dly. The tafte, appetite, and fancy, influence the procefs confiderably; an antipathy conceived againft even a wholefome food, will prevent its digeftion. If the living powers of the ftomach be ftrong, the food will be perfectly digefted; while, under contrary circumftances, the fame food would undergo chemical changes. Hence, if too large a quantity, or an indigeftible fort of food, or fuch as the ftomach has not been accuftomed to, be taken into a weak ftomach, it will be converted into a matter, which may be taken up with the chyle, and produce noxious effects on the fyftem, as too much falted animal food does in failors; or it may be converted into fubftances noxious to the ftomach and inteftines, as in heart-burn, vomiting, &c.; or its effects on the organs of digeftion may be noxious to the whole fyftem, caufing fever, &c. On the other hand, ftrong ftomachs, and particularly fuch as are habituated to any particular kind of food, derive perfect nourifhment from fuch food, whatever it be. Thus, a Laplander lives upon reindeer alone, without intermixing, for moft part of the year, any vegetable food; and others live on fhell-fifh, dead and putrid feals and whales, &c. Hence, particular kinds of food are not more capable, in themfelves, of affording good chyle; but particular fpecies muft be adapted to the ftate of the digeftive organs, in order to be that which is moft proper or wholefome; or, in other words, no food is, in itfelf, wholefome or unwholefome, but as it is compared with the prefent ftate of the ftomach and organs of digeftion.

Dr. Fordyce, in his Treatife on Digeftion, argues againft the opinion which afcribes digeftion to any folvent fluid formed in the ftomach, and he appears to confider it as a chemical procefs, effected by the living powers of the ftomach. He obferves, that the fubftances employed for food, yield the fame elements on analyfis as chyle, and that food and chyle differ only in the mode of combination of thefe elements. "Digeftion (fays he, p. 166) is performed on fubftances containing all the elements of chyle. Thefe fubftances in the ftomach, and other organs of digeftion, have their elements feparated from one another by the effects of the ftomach, and other organs of digeftion upon them, occafioning in them a decompofition and recombination of their elements into a new fubftance."

Reft of the body feems an effential condition to the right performance of digeftion; exercife interrupts it, and this has been proved by direct experiment on two dogs, who were fed at the fame time. One was allowed to lie down quiet, while the other was taken out hunting, and they were then both killed. The aliment in the dog who had been exerting himfelf was unchanged.

The

The food remains in the ftomach a longer or fhorter time, according as its nature difpofes it to yield more or lefs readily to the action of that organ. Goffe, of Geneva, found, by experiments on himfelf, that animal and vegetable fibres, concrete albumen, the white and tendinous parts of animals, paftes made with fat and buttery fubftances, unfermented, or flightly fermentable matters, remain longer in the ftomach than the gelatinous parts of animals and vegetables, fermented bread, &c. That the latter only required an hour for their diffolution, while the former were hardly diffolved in feveral hours. It feems hardly poffible to lay down any general rule, on account of the great variety of alimentary articles. It fhould appear, that the various parts of a meal go off in proportion as they are digefted; water and mild fluids muft pafs very quickly through the ftomach, for they are feparated by the kidneys fo foon after drinking, as to have induced many phyfiologifts to fufpect a fhorter communication between the ftomach and kidneys than by means of the inteftines, lacteals, and general circulation. According to Viridet, watery fluids pafs in half an hour; ripe fruits, light meats and bread, in from three to five hours; harder meats not till the 7th or 8th hour. In wounds of the inteftines, milk has come out in half an hour, and foon after in a coagulated ftate. In another cafe of that kind, beer appeared in an hour; ripe fruits and vegetables in two hours; meat and bread in nine hours. Thefe circumftances, however, would be influenced by the unnatural ftate of the fubject. "I have obferved (fays Haller) what paffed in my own perfon, when my digeftion was not good, and when eructations, impregnated with the tafte of the food, afcended from time to time. I ftill perceived a kind of commotion in the meat, which my ftomach did not act on well, four hours after the meal: this gradually fubfided, and in fix hours after a moderate dinner, my ftomach was empty, and pure air alone afcended." Elem. Phyfiol. tom. 6. p. 281.

An interefting cafe of fiftulous opening in the ftomach, communicating externally, and related by Richerand in his "Nouveaux Elemens de Phyfiologie," throws much light on the fubject of digeftion. The aperture, more than 18 lines long, and an inch broad, expofes the interior of the ftomach. It came on in confequence of an injury, and had exifted for many years. At the admiffion of this patient into the Hofpice de la Charité, fhe ate three times as much as ordinary perfons, made about a pint of urine daily, and had a ftool once in three days. Three or four hours after a meal, an irrefiftible feeling compelled her to remove the dreffings of the fiftula, and to allow the efcape of the food, which the ftomach could no longer contain. The contents came out quickly, accompanied by more or lefs air. They poffeffed a faint odour, but had neither acid nor alkaline properties; for the greyifh pafte, of which they confifted, when diluted with diftilled water, did not affect the vegetable blue. The digeftion was often far from complete, yet frequently the odour of wine was deftroyed, and bread was reduced to a foft, vifcous, and thick fubftance, refembling fibrine recently precipitated by the acetous acid, and fwimming in a ftringy fluid of the colour of ordinary foup. The experiments made on this half-digefted food, at the Ecole de Medecine, fhewed, that the changes which it had undergone were an increafe of gelatine, the formation of a fubftance like fibrine, and of a confiderable proportion of muriate and phofphate of foda, and phofphate of lime. This patient could never fleep until after fhe had emptied her ftomach, and wafhed it out by drinking infufion of camomile. In the morning it contained a fmall quantity of thick and frothy liquid, analogous to faliva, which did not affect the vegetable blue, and contained parts of more confiftence, and even compleatly opaque albuminous flocculi mingled with the liquid portion. The refults of chemical experiment on this liquid, were fimilar to thofe obtained from the fpittle.

This patient, thin and emaciated, dragged on a feeble and languifhing exiftence, fupported by the fmall quantity of food which paffed through the pylorus, to receive the influence of the biliary fecretion, the action of which, on the chyme, is effential to the feparation of its nutritive portions. The fmall quantity of nourifhment that could be taken up by the abforbents of the ftomach, contributed very little to fupport the frame; and the patient, therefore, was circumftanced like thofe who have a difeafed pylorus, which, refufing to yield, when digeftion is accomplifhed, caufes the food to be vomited up. While the diffolution of the food is proceeding, both orifices of the ftomach are clofed; no gas, difengaged from the food, afcends through the œfophagus, except from imperfection in the procefs. Slight fhiverings are felt; the pulfe becomes quick and firm; and the vital powers feem to be diminifhed in the body at large, that they may be increafed in the organ of the digeftive procefs. Soon the coats of the ftomach begin to act; the circular fibres contract in different parts; thefe periftaltic ofcillations, at firft vague and irregular, are repeated from above downwards, and from left to right; that is, from the œfophageal towards the pyloric orifice. The longitudinal fibres fhorten it in its long diameter, fo as to approximate the two orifices. In thefe motions the ftomach is elevated on the pylorus, fo as to efface the angle which it forms at the commencement of the duodenum, and thereby to facilitate the food's paffage.

The pyloric fphincter remains contracted while digeftion is going on, and prevents the paffage of thofe portions which are not fufficiently fubdued. Endowed, probably, with a peculiar and delicate fenfibility, the pylorus, as its name imports, may be regarded as a vigilant fentinel, obftructing the egrefs of all which is not duly changed. Hence feveral authors have obferved, that the aliments do not quit the ftomach in the order of their admiffion into that cavity, but according to their greater or lefs digeftibility; we might, therefore, affert that there is a real feparation of the food in the ftomach. The moft fpeedily diffolved aliments are directed towards the pylorus, which yields to them, and rejects thofe, which being infufficiently digefted, do not convey a fuitable impreffion to the part. The paffage of coins may be objected to this delicate fenfibility of the pyloric fphincter: but let it be remembered that thefe, and other indigeftible fubftances, remain in the ftomach fome time before they pafs, are repeatedly prefented to the pylorus, and thus accuftom that part to their contact. The gaftric fyftem may be compared in this refpect to a fecretory gland; and as the excretory tubes, poffeffing a fpecies of *elective* fenfibility, do not admit the fecreted fluid until it has been duly prepared in the glandular parenchyma; fo the pylorus will not allow the food to pafs into the inteftine, which may be regarded as the excretory duct of the ftomach, until it has been fufficiently elaborated in that organ.

As the ftomach frees itfelf the fpafm of the fkin ceafes, a gentle warmth fucceeds; the pulfe becomes fuller, and the infenfible tranfpiration increafes. Digeftion, therefore, produces a general movement, analogous to a febrile attack; and this effect, remarked by the ancients, is particularly obfervable in females of great fenfibility. The action of the ftomach does not ceafe until it has entirely expelled its contents. The gaftric juice, no longer called for by the prefence of food, is poured out in fmaller quantity, or perhaps not at all; and the parietes, brought into contact with

each

each other, are lubricated by the mucous fecretions of the part.

For further obfervations on the action of the ftomach, on vomiting, on its fympathies with other organs, &c. See STOMACH.

Chylification.

The aliments having fuffered the firft degree of affimilation, quit the ftomach, pafs into the duodenum, and there experience new changes, as effential as thofe which they underwent in the ftomach; this procefs is named chylification. The food confifts now of a half liquid pultaceous mafs, with a confiderable mixture of matter foreign to the purpofe of nutrition, the grofs refidue of its decompofition. The latter part is only fit to be expelled; and the action of the inteftines confifts in extracting from it the nutritive fluid, in feparating the excrementitious portion, and in forming a mild, white, emulfive, and highly nutritive liquor, which is to be abforbed by the lacteals and conveyed by them into the circulating fyftem. We may indeed affirm, fince the chief end of digeftion confifts in the feparation of the nutritive fubftance into two parts, an excrementitious and a chylous portion, that the duodenum, in which that feparation is effected, is its principal organ. The moft attentive examination of the greyifh chyme, as it leaves the ftomach, difcovers to us nothing but a foft homogeneous pap; and the abforbents of that organ never contain, like thofe of the inteftines, true chyle. The duodenum may, in truth, be regarded as a fecond ftomach, as it is diftinguifhed from the reft of the fmall inteftine by being fituated externally to the peritoneum, by its magnitude, by its fixed curves, large number of valvulæ conniventes and lacteals; and particularly by its receiving the terminations of the pancreatic and biliary ducts. All thefe peculiarities retard the courfe of the alimentary fubftance, and prolong the term of its expofure to the action of the laft-mentioned fluids.

The irritation of the chyme in the duodenum is tranfmitted to the liver and gall-bladder, and induces an increafed flow of hepatic and cyftic bile diluted by the fluid of the pancreas, which probably participates in the general irritation and increafed fecretion of all the gaftric organs. This mixed pancreatico-biliary fluid, poured on the chymous mafs, penetrates, dilutes, and animalizes it; feparates the chyle from the excrementitious part, and precipitates from it whatever is not nutritious. In this procefs the bile itfelf feems to feparate into two portions. Its oily, colouring, and bitter part combines with the excrement, and imparts to it, thofe ftimulating properties, by means of which it excites the action of the alimentary tube; while the albuminous and faline portions mixed with the chyle, and being abforbed with it, re enter the circulating fyftem. In fact, the contents of the fmall inteftine exhibit two very diftinct fubftances after the admixture of the pancreatico-biliary fluid; one is a whitifh milky matter, found at the furface, and adhering to the inteftine; the other, more abundant, is yellowifh: and when digeftion is well performed, contains no traces of the nature of the food. A further account of the pancreatic and biliary fluids will be found under PANCREAS, LIVER, and BILE.

There is probably another fluid, befides thofe now enumerated, concerned in the bufinefs of chylification; a fecretion from the villous coat of the inteftines, fuppofed to be analogous to that of the ftomach, and named *fuccus inteftinalis.* There muft alfo be a confiderable effufion of mucus into the fmall inteftines, as the glands of that nature abound in the inteftinal coats, particularly towards the latter portion of the tube. All, however, that we know on the fubject of the inteftinal fluid is mere matter of fpeculation, derived from analogy and conjecture, and unfupported by direct experiment and obfervation, which the very nature of the fubject feems entirely to preclude.

The action of the inteftines is not confined to a change in the external and phyfical qualities of the food; it affects alfo their internal chemical properties. The developement of a gelatino-mucus fubftance, the formation of feveral falts, the diminution of acids in general, and of the carbonic acid in particular, an increafe of azote and hydrogen, and the production of the principle of fugar, are the effential changes which the food undergoes in the inteftines. Yet the united agencies of the ftomach and inteftinal tube do not always fucceed in changing the nature of the various matters fubmitted to their action. The qualities of the food often affect very fenfibly the chyle, blood, urine, milk, &c. Indigo tinges the chyle of a blue colour. The urine, fweat, and milk are affected by the colour, odour, tafte, or medicinal qualities of rhubarb, fcammony, violets, and other vegetable matters. The fat of fowls becomes infected with the fmell of garlic; the flefh of fome birds is purgative, when they feed on particular vegetables; and the fifhy tafte of fuch as ufe fifh for their food, is well known.

Of the effect produced by the inteftines in the function of affimilation, we may obferve, as we did of that fhare of the procefs performed in the ftomach, that it is a living action, explicable only by means of the vital powers. Thefe regulate and modify the changes and combinations of the food; and hence the matter extracted from the aliment poffeffes a fpecific character derived entirely from the properties of life. Hence the mixture of faliva, gaftric juice, bile, and pancreatic liquor, with the food, out of the body, would never form chyle, nor any thing like it.

Action of the fmall Inteftine.

The alimentary mafs, feparated in the duodenum, in the manner already defcribed, into two portions, enters the jejunum, and fubfequently the ilium. Its paffage is retarded by the numerous curvatures of the canal, which fome phyfiologifts, indulging in a poetic ftrain, have compared to the windings of a ftream enriching the foil through which it meanders. Thefe retain the aliment, in order that the chyle, expreffed by the periftaltic contraction of the inteftines, may be repeatedly prefented to the inhalant orifices of the lacteals; which are particularly numerous on the furface of the valvulæ conniventes. The paffage of the inteftinal contents is not only retarded by thefe projections; but, as the contraction of the tube forces them into the alimentary mafs, the lacteals may be faid to feek in its interior the particles fit for abforption.

The number of valves diminifhing with that of the abforbing veffels, towards the lower part of the canal, the progrefs of the food is gradually accelerated in proportion as its nutritive parts are removed. The inteftinal mucus, fecreted more abundantly in this part, envelopes it and facilitates its tranfmiffion. The periftaltic action, by which it is urged through the inteftine, is not a regular contraction proceeding from above downwards; but an undulatory or vermicular motion, commencing at once in feveral points, and deftroying the inteftinal curves in thofe parts, by converting them into ftraight lines. The portions immediately adjoining the contracted parts are dilated by the fluid impelled into them, and contract in their turn. The motion from above downwards prevails at laft, fo as to urge the refidue of the chyme, from which the lacteals have extracted the chylous or nutritive parts, into the large inteftine. The caufe of the periftaltic motion, which is obferved in the mufcular fibres of the inteftine,

inteftine, is the irritation of the aliment on the furface of the villous coat.

Nature and Properties of Chyle.

The difficulty of collecting a fufficient quantity of this fluid from the lacteals, for the purpofe of examination and analyfis, has left us in much ignorance concerning its nature. It feems to continue the fame, in animals of the fame fpecies, notwithftanding variations in their food. Yet it varies in the different claffes of animals; being of a milky white in man and quadrupeds; tranfparent as water in birds and fifhes; and fome have defcribed it as greenifh in the herbivora. Other differences may perhaps exift in its properties in various genera; but, as far as our knowledge hitherto extends, it feems never to vary in man, however his food may be changed.

In fpite of the importance of the refearch, which we fhould have expected to attract very early the notice of the philofopher and chemift, our knowledge of the chyle is very limited, and its analyfis has hardly been attempted in a regular and fcientific manner. Some defcribe it as having the mild and flightly falt tafte of milk; as fwimming in the ferum of the blood, and poffeffing the lightnefs of oil; as uniting difficultly with water; as coagulating after death in its own veffels, in the thoracic duct, or in parts where it has been effufed. Others afcribe to it a cafeous and a buttery matter; an abundance of earth; and fome even admit a vegetable farina, combined with animal oil and lymph. It has alfo been reprefented as an oily matter, held in folution in water by means of a mucous principle. Dr. Fordyce's defcription feems on the whole to be the moft complete, and we fhall therefore extract it from his "Treatife on Digeftion."

"The chyle confifts of three parts; a part which is fluid and contained in the lacteals, but coagulates on extravafation. Whether the veffels act upon it fo as to prevent it from coagulating; that is, fo as to keep it diffolved in water and fluid; or whether the fluid itfelf is alive, and coagulates by death, in confequence of extravafation, is an argument which I fhall here not enter into. The fecond part confifts of a fluid, which is coagulable by heat, and in all its properties refembles the ferum of the blood. (N. B. The chyle received into a veffel feparates into thefe two parts; the coagulum is thick and firm and floats on the furface of the fluid portion. When an animal is killed, while the chyle is paffing from the inteftines into the lacteals, thofe veffels are found filled with a coagulated fluid; and in this way Mr. Cruikfhank has been enabled to reprefent them in his work on the abforbents.) The third part confifts of globules, which render the whole white and opaque. Thefe globules have been fuppofed by many to be expreffed oil; but this has not been proved. Neither has it been perfectly demonftrated that fugar is contained in the chyle, although it has been made very probable. The part coagulating on extravafation, the part agreeing with ferum in its qualities, and the globular part, which, in fome animals, but not in quadrupeds, exifts without giving whitenefs to the chyle, alone, or along with fugar, form the effential parts of the chyle.

"A great many fubftances may enter the lacteals along with the chyle; even folids reduced to fine powder. When indigo has been thrown into the inteftine of a fheep, I have feen the chyle rendered quite blue; now indigo is not foluble in water, but is a folid reduced into a very fine powder. So mufk gets into the chyle, giving it a ftrong fmell, and a great variety of other fubftances, of various colours, various taftes, and various fmells, each of them giving colour, or tafte, or fmell to the chyle. Neverthelefs, the lacteals feem to poffefs fome power of rejection, fince green vitriol, either exhibited along with the food, or thrown into the inteftine after the animal has been opened, while the chyle was forming and abforbing, gives no colour on infufion of gall being applied to the chyle: nor if galls be thrown into the ftomach along with the food; or if an infufion of them be in like manner, thrown into the inteftine, when an animal is opened during the time that the chyle is flowing into the lacteals, do they give any colour upon a folution of green vitriol being applied to the chyle; the galls might be fuppofed to be digefted, but the green vitriol could not; neither can we well believe that the galls could be digefted when thrown into a portion of the jejunum of about a foot in length tied at both ends.

"The lacteals, therefore, would feem to be ready to take in many things not digefted, but not all. One would be difpofed to believe that what was injurious to the fyftem would be rejected by this power; yet when we confider the great reafon we have to believe that cantharides, mercury, and many other fubftances, are abforbed by them, which certainly are in many cafes deleterious; we cannot well ground any doctrine on green vitriol and galls not being abforbed.

"The fubftances which I have above pointed out to be the effential parts of the chyle, are totally different in all their properties from farinaceous matter, as well as the greateft part of the other fubftances employed for food. A change confequently of the properties of fubftances employed for food muft take place in the organs of digeftion, fo as to convert the food into thefe different fubftances effentially contained in the chyle."

The fame author obferves again, "that the three parts conftituting the chyle are exactly the fame, whether the matter of a mufcular fibre, or farinaceous matter be digefted; for I have fed a dog with farinaceous matter, and another with mufcular fibre, and opening them both during the time that the chyle flowed through the lacteals, collecting as much chyle as could be collected from each; on examination of their properties, they both confifted of the three effential parts I have already enumerated, each of thefe parts in the one was perfectly fimilar, as far as I could contrive any experiment, to thofe of the other."

"Moreover, in like manner, the properties of the part of the chyle ought to be different, when any one other of the feveral fpecies of matter which may be employed for food is ufed; but that is by no means the cafe. The chyle of a cat, for inftance, wholly living on animal food, is the fame with, and cannot be diftinguifhed from, the chyle of an ox or fheep, living wholly on grafs."

With all deference to the authority of the refpected phyfiologift, whofe words have juft been quoted, we think fome of his opinions not yet fufficiently fupported by obfervation and experiment; and we fhall venture to fubmit that the following queftions are ftill undecided, and form curious problems, towards the folution of which the united labours of the chemift and phyfiologift might be very advantageoufly directed. Does the nature of the food influence the character and properties of chyle? Does chyle receive an impreffion from the properties of fubftances employed for food; and does it prefent, after its formation, any qualities analogous to thofe of the alimentary matters? Are not the diftinctive characters of chyle decided by the characteriftic properties of foods?

In refpect to the tranfmiffion of colouring and odorous properties to the chyle, different ftatements have been given by various phyfiologifts. Some reprefent, with Fordyce, that indigo will turn it blue, that yolk of egg, or beet root, will

will make it yellow and red, &c. But, according to Fourcroy, (Syst. de Conn. Chem. tom. 10. p. 66.) Hallé never found coloured matters affect the chyle in numerous experiments; and Dumas (Princip s de Physiol. tom. 4. p. 406.) confirms this account by the result of his own experiments with various coloured and odorous substances.

Conversion of the Residue of the Food into Excrement.

The residue of the alimentary matter, consisting of the excrementitious part of the chyme with the oily, resinous, and colouring portions of the bile, is transmitted by the peristaltic action of the small intestine, into the last division of the digestive tube, the large intestine. Here it undergoes a further change, by which it is converted into a peculiar state, denominated *fæces*. The large intestine, then, is the organ of this last change in the food, and it is further to be considered as a reservoir designed to hold the excrement until it has accumulated to a certain quantity, and thereby to relieve us from the disgusting necessity of its constant efflux. Here also absorption of any nutritive parts that may have escaped the lacteals is carried on, but to a much smaller extent, as the diminished number of absorbent tubes sufficiently testifies. That matters, however, are absorbed, even from this portion of the canal, is abundantly evident from various considerations. The residue of the chyme is not more consistent than a thick cream in the ileum, the greater firmness of the fœcal matter evinces the absorption of the more fluid parts. Rhubarb injected in clysters has imparted a yellow tint to the urine; and camphor, garlick, &c. have affected the pulmonary exhalation with their peculiar odours. Spirituous liquors and opium have also produced their effects on the constitution. Nutritive clysters, consisting of milk, broth, &c. have, in various instances, supported life for several days, and even weeks. They have been retained in the rectum, and fœces have been expelled at certain intervals. In the case of stricture of the œsophagus, related in Dr. Currie's Medical Reports, life was supported in this way from October 18th, to December 6. The patient began with three clysters a-day, each of which consisted of eight ounces of strong broth, two yolks of egg, and forty drops of laudanum. As the retentive powers of the rectum improved, each clyster was increased to ten ounces of broth, three yolks of egg, sixty drops of laudanum, and eight ounces of wine. He had three or four solid, homogeneous stools of the accustomed fetor, but lighter than usual in colour, in each week. His hunger was relieved by the injections. Are we to suppose that these never passed beyond the valvula coli; that the body could be nourished for six or seven weeks by the absorbents of the large intestine; and that this organ could make natural fœces from aliment which had never undergone the action of the stomach and small intestine? Or ought we rather to suppose that the clysters had entered the small intestine? On the former supposition, we can easily explain why the body could not be nourished for a longer time *per anum*; the comparatively small number of absorbents in the large intestine, and the want of the preliminary preparation of the aliment by means of the saliva, gastric juice, bile, pancreatic, and intestinal fluids, will sufficiently account for the fact. At all events, we can only look to the employment of nutritive clysters as a means of temporary support; yet undoubtedly an efficacious and highly useful one for a short time.

It has been generally represented by physiologists, that the fœces are the mere remains of the food undergoing certain changes of a putrefactive kind from their residence in the body. And the fœtor which they possess seems to have been the chief circumstance leading to such an opinion. We are, however, fully convinced that this sentiment is erroneous, and that the conversion of the residual part of the chyme into fœces is no less a vital process than the changes which the food experiences in the stomach or small intestine; and that it will not admit of explanation on the supposition of spontaneous processes, such as putrefaction or fermentation, any more than digestion or chylification. The food or chyme exposed out of the body to putrefaction would exhibit appearances altogether different from that homogeneous and solid texture which we see in healthy excrement. The disengagement of ammonia, and the formation of various volatile products, would be the most striking features of its decomposition, neither of which take place in the body. Why should fœces appear only in the large intestine, and never in the small? And why should the valve of the colon form so accurate a boundary between the residue of the chyme, a mild inodorous fluid, and the fœtid excrement, unless the properties of the latter were owing to the peculiar vital action of the large intestine? The fœcal vomitings attendant on some diseases do not contradict this statement, inasmuch as they are partly explicable by the rejection of the yellow contents of the small intestine, mistaken for real excrement; and partly, if true fœces are actually thrown up, by an inverted peristaltic action overcoming the resistance of the valvula coli. So far from the fœces being the remains of the food in a putrid state, we may affirm that they do not approximate to putridity in any character but the smell, which, too, is a peculiar and not a putrid odour. The vital changes which the aliments undergo, actually protects them from spontaneous degeneration, insomuch, that in cases of costiveness, the fœces remain unaltered in the intestines for weeks. If any chemical changes are observed in the digestive process, they indicate an imperfect state of that function, and they produce unusual and unhealthy appearances in the evacuated matters, and sympathetic disturbances of the whole constitution. Natural excrement, indeed, is never voided, except when the vital changes operated in the stomach and small intestine have preceded the vital action of the large intestine; and when the whole has been accomplished without any chemical change or spontaneous degeneration.

To the question how these changes are produced, we shall not perhaps be able to give a very satisfactory reply. We have already noticed the absorption carried on from the large intestine. There is also no doubt a secretion, particularly of mucous fluids from the surface, which may have some further effect than that of merely facilitating the progress of the intestinal contents. We are ignorant of the exact nature of those in a state of health; but we often find very copious morbid secretions evacuated *per anum* in disease. The appendix vermiformis has appeared to some persons a chief agent in the process of fœcification, not upon any sufficient grounds, for it exists in very few animals, and it has been lost in cases of mortified hernia, in the human subject, without injury.

Air is disengaged in small quantities in the small intestine, but still more copiously in the large, which is frequently found distended from this cause, in the bodies of very healthy subjects. This may partly be atmospheric air swallowed with the food; but it consists in a greater portion of other gases, as sulphurated hydrogen.

Action of the large Intestine.

The contents of the large, as those of the small, are carried forwards by a species of peristaltic motion. And this process is partly owing to the alternate pressure of the diaphragm and abdominal muscles; partly to the action of the muscular coat of the intestine. How essential the latter is, may be collected from the inability to void the fœces by the mere act of straining, and from the evacuation being performed by the

the inteftine only in animals whofe abdomen has been laid open, and in perfons who have taken purgative medicines. This irritability of the large inteftine continues after apparent death, fo as to produce even a degree of alvine evacuation.

The longitudinal mufcular fibres, being collected into ftrong bands, and more numerous than in the fmall inteftine, act more powerfully. They are contracted towards the appendix vermiformis, in which they all terminate as in a common centre; they fhorten and dilate the inteftine, thereby render it fit to receive the alimentary refidue from the ileum, and contribute to its progreffion. The circular mufcular fibres, when diftended by fœces or flatus, contract and propel it towards the rectum. The portion thus contracted is dilated by means of the longitudinal bands, and thus prepared for receiving new arrivals of fœcal matter. The periftaltic action is perhaps moft efficacious in the rectum, as that part has the ftrongeft mufcular covering. There is too in the large, as in the fmall inteftine, a retrograde or antiperiftaltic effect, but it is weaker. It contributes to the longer retention, and more perfect elaboration of the fœces. The reality of this antiperiftaltic motion is fhewn by the vomiting of clyfters thrown into the rectum.

The fœces are gradually collected in the rectum, which admits readily of diftenfion, for which it is particularly adapted by its nearly horizontal pofition, in the erect pofture of the body. They are retained for various fpaces from twelve to twenty-four hours, until their weight, quantity, hardnefs, or acrimony, ftimulate the inteftine to action. The time of retention varies, even under circumftances of health, according to the irritability, age, habits, &c. of the individual; according to the nature of the bile, the kind and quantity of the food, &c. If the fubject be young, fenfible, and irritable; the food containing much falt or fpices, and abundant; the drink falt or ftimulating; the bile fully formed; the excrement itfelf liquid; and the fubject accuftomed to evacuate it on the firft call, ftools will take place at fhorter intervals. A coftive ftate of bowels will be found in aged, weak, and torpid fubjects, in fuch as take moderate quantities of mild and oily foods; where the bile is lefs in amount, and not fully developed in all its properties, and the excrement itfelf hard. Hence the bowels have been coftive for weeks, and even months, but the perfons were indeed valetudinarians. The ingefta pafs through the whole alimentary tube, in from fix to twenty-four hours. If their retention exceeds the latter period, fomething unnatural may be fufpected, although often they are evacuated at much longer intervals without any ill confequences. Habit has much influence in this refpect, both in determining the length of the interval, and the precife time of day at which the evacuation takes place.

Evacuation of the Fæces.

This is to a certain degree arbitrary in a healthy perfon, as it admits of being delayed for fome time; but when the contractions of the rectum come on pretty ftrongly, it is no longer in the power of the will to avoid the expulfion of the fœces. The act itfelf is preceded by a fenfation of ftimulus, and dull pain in the lower part of the belly, to which are added flight fhiverings. This unpleafant feeling excites us to employ that effort termed ftraining (See RESPIRATION); and to exert the diaphragm and abdominal mufcles in combination, in order, by their preffure on the rectum, to overcome the refiftance of the fphincter ani, and expel the contents of the rectum. The levatores ani fix and fupport the gut, and prevent it from yielding too much to this protrufive effort. When the anus is fufficiently opened by means of this action of the refpiratory mufcles, the rectum is emptied by its own living powers; by the irritability of its mufcular fibres. The ftraining is therefore moderated, or entirely remitted, and the reft of the expulfive act is accomplifhed without the aid of the will. When the large inteftine is completely unloaded, the protruded rectum is reftored to its fituation, by the levatores ani, affifted by the proper longitudinal fibres of the gut, and the anus is clofed by means of its fphincter. A fenfe of pleafure, not only in the part, but extending more or lefs over the whole body, accompanies the act.

Nature and Properties of the Fæces.

Some degree of variation in the confiftence of the fœces is compatible with a ftate of health. They may be fo firm as to have a conglomerated appearance, probably from being formed in the cells of the colon, or fo much fofter as not to preferve this. Longer retention will contribute to that appearance, and the fame circumftance in excefs caufes a difeafed ftate of the evacuations, in which they form hard balls called fcybala.

Their colour depends on the admixture of bile; and muft therefore vary according to the nature and properties of that fluid. In the moft healthy ftate it fhould refemble wetted rhubarb. Entire abfence of bile generally makes the fœces of a clayey appearance; and an altered biliary fecretion will caufe them to appear dark brown, green, black, &c., all which are morbid. Yet the colour is influenced, as well as the confiftence, by retention; becoming dark brown. The confiftence fhould be homogeneous; and there fhould not be any appearance of the food, as that indicates imperfect digeftion. Yet fome exceptions are made to this rule; fpinach is faid to impart a green, and beet-root a red tint to the ftools. The fibrous parts of animal and vegetable matter; hufks of grain, &c.; membranous parts, as fkin of apples, grapes, &c. are often difcerned. Traces of falted or fmoked meats are difcovered more frequently than thofe of recent animal food. Haller ftates their quantity at 5 oz. or rather more, when they are well formed; the quantity is greater when they are fluid. They are more fœtid and lefs in quantity from animal, than from vegetable fubftances, (being from 8 to 16 oz. in the latter cafe, according to Rye). Yet where milk alone, and bread and water are taken, the fœces poffefs a fimilar odour to that of thofe formed from meat or mixed diet. The tafte is faid to be fweetifh bitter and vapid, with fometimes an acid admixture.

Chemical Analyfis.

In a recent ftate they do not affect vegetable blue infufions: lofe about three-fourths of their weight when dried upon a water bath. When diffufed in water, and ftrained through linen, a greyifh brown matter remains; exhibiting, when dried, fome vegetable remains, and amounting, in quantity, to $\frac{7}{100}$ of the whole. The ftrained liquid depofited, on ftanding, a yellowifh green flimy matter, feparable by the filter, and amounting to $\frac{14}{100}$. This was compofed of a fatty matter, feparable by alcohol, and confidered as the refin of the bile a little altered: of a yellow fubftance diffolved by water, and poffeffing the properties of gelatine or mucus: and of a greenifh grey refidue, infoluble in water and alcohol, and leaving, when incinerated, fome filica and phofphate of potafh. The liquid that paffed the filter was at firft yellow, then grew brown, and afterwards muddy: it contained albumen, bile, a peculiar reddifh brown fubftance, fuppofed to be refin of bile in an altered ftate, and various falts.

 The

The following is the refult of the analyfis:

Water - - - - -	73.3
Vegetable and animal remains - -	7.0
Bile - - - - -	0.9
Albumen . - - - -	0.9
Peculiar extractive matter - -	2.7
Salts - - - - -	1.2
Slimy matter, confifting of refin of bile, peculiar animal matter, and infoluble refidue - - - -	14.0
	100.0

The falts were carbonate of foda, muriate of foda, phofphate of lime, fulphate of foda, and ammoniaco-phofphate of magnefia.

Having thus concluded our account of the digeftive procefs, we fhall clofe the prefent article with a fingle remark, which flows naturally from the preceding ftatements. The converfion of our food into the nutritive fluid by which the growth of our body is effected, and the loffes of its organs are fupplied, is an extremely complicated function, dependent on the right performance of feveral fecretions, and the healthy action of various mufcular and irritable organs. The vifcera, in which thefe fecretions are accomplifhed, are obnoxious to difeafe from many caufes; the fecretions themfelves, and the irritable action of the alimentary tube, although not influenced by the will, are obvioufly affected in a great degree by the ftate of the brain and nerves. The digeftive canal is expofed to numerous fources of indifpofition, from the improper nature and quantity of the food and drink, in which, from the artificial ftate of fociety, and the general prevalence of unnatural and luxurious habits, hardly any individual can be faid to purfue a ftrictly healthy plan. When any one part of this feries of organs and functions is deranged from any of the caufes now alluded to; when any difeafe of an idiopathic kind occurs in either of the long chain of parts immediately or remotely fubfervient to the digeftive procefs; when diforder arifes from improper diet; or when it is more remotely induced by the influence of irritation or diforder in the nervous fyftem, affecting the fecretions and contractions on which the chylopoietic procefs hinges: when, we repeat, any one part of the fyftem is thus difturbed, derangement of the whole, from the mutual connection and dependency of all the parts, will be the probable refult. As the chyle, the formation of which is the leading object of the whole digeftive fyftem, cannot be rightly formed when that procefs is difturbed; and as this fluid is the great means of fupport and repair to the body, the ftate of our whole frame will be influenced by the difturbance of the digeftive organs; the nutritive fluid, not being duly prepared, will affect the nervous fyftem, and thereby again operate on the digeftive organs. From the confiderations now thrown out, it will be obvious that difturbances of the digeftive organs muft be concerned, either as a caufe or a confequence of difeafe in a very large (probably much the largeft) fhare of diforders that are prefented to the obfervation both of the phyfician and furgeon; and the important practical confequences that may be drawn from thefe premifes, are too obvious to efcape the notice of the moft fuperficial. To follow their explanation any farther would be encroaching on the province of the pathologift and practitioner. Haller's Elementa Phyfiologiæ, tom. 6 & 7. Wrifberg and Meckel's Notes in the laft edition of the Phyfiology, by Leveling. Dumas Principes de Phyfiologie, tom. 4. Richerand Nouveaux Elemens de Phyfiologie, tom. 1. Soemmering de Corp. Human. Fabrica, tom. 6. Fordyce on Digeftion. Hunter on the Animal Economy. Thomfon's Chemiftry, vol. 5. Metzger Ventriculus Humanus Anatomicè & Phyfiologicè Confideratus. Regiom. 1788. 4. Spallanzani Differtationi di Fifica Animale et Vegetabile. Modena. 1780. French tranflation of it by Senebier. Geneva. 1783. Englifh verfion, with Dr. Stevens's Experiments. Veratti in Comment. Bonon. tom. 6. G. I. Hildebrandt Gefchichte der unreinigkeiten im magen und den Gedärmen. 3 bände. Braunfchweig. 1790. 8. Hallé Theorie de l'Animalization et Affimilation. Pearfon's Practical Synopfis of the Materia Medica & Alimentaria.

Digestion *of Birds*, in *Comparative Anatomy*. See *Anatomy of* Birds.

Digestion, in *Chemiftry*, is a long continued maceration of any fubftance in any folvent liquid, at a temperature kept fteadily above the natural heat of the atmofphere. It differs from fimple maceration only in the temperature ufed.

Digestion, in *Surgery*, expreffes a difpofition in abfceffes to ripen and come to fuppuration.

Tumours, arifing on the parotides of children, are of eafy digeftion: they ripen in a little time. Dionis.

DIGESTIVE Faculty. The ancient philofophers admitted a digeftive faculty, or quality, in the human body; as not knowing how otherwife to account for the act of digeftion. See Digestion.

Digestive is alfo ufed, in *Medicine*, for fuch remedies as ftrengthen and increafe the tone of the ftomach, and affift in the digeftion of foods. To this clafs belong all ftomachics and ftrengtheners, or corroborants.

Digestive *Remedies*, in *Surgery*, are thofe applications which the older furgeons confidered as being efficacious to promote fuppuration in wounds. (See Digestion and Suppuration.) Whatever has a tendency to excite the healthy action of the arteries in wounds, may produce a fecretion of *pus*, and in this fenfe, may not improperly be called a digeftive remedy. All unguents, containing turpentine, rofin, aloes, and balfamic fubftances, poffefs this quality: but the common yellow bafilicum and tar-ointment are the moft celebrated now in ufe. See Ointment.

Digestive *Salt*, in *Chemiftry*, one of the names formerly given to muriat of potafh.

DIGESTOR. A digeftor is a thick iron boiler furnifhed with a ftrong lid, which is made to fcrew down perfectly tight, fo as to confine all the fteam or vapour from the inclofed liquid, and thereby enable it to acquire a degree of heat much higher than its natural boiling point.

This veffel was at firft contrived by Papin in the following way: A cylindrical veffel is made, about a foot high, and fix inches in diameter, of caft-iron, or brafs, an inch thick, and turned very fmooth on the infide. At the upper end of the cylinder is a large opening of an oval form. A plate is then made of the fame thicknefs as the cylinder, and of an oval form, like the aperture, but half an inch broader. To this plate is fixed a fcrew, which paffes through a thick piece of leather, with which the plate is covered. When the veffel is filled with the fubftance intended to be heated, the plate is introduced into the cylinder (which the oval form of the aperture allows of) and is turned in fuch a manner, that when it is pulled, the veffel is clofely fhut up from the infide. The projecting fcrew is then thruft through a hole made in the middle of a very ftrong bolt attached to the veffel, and, by means of the nut, the fcrew is drawn fo tight, as to prefs the cover ftrongly up againft the oval aperture, and thus to clofe it perfectly.

Some alterations have been made in the conftruction of the digeftor, and mode of adapting the cover, and, in

in particular, a safety-valve has been added, the stopper of which may be loaded by weights, or kept down by a lever, so that the degree of condensation of the confined vapor (and, consequently, the intensity of heat within) may be regulated with tolerable accuracy.

The inventor, Papin, tried several curious experiments with this vessel, particularly on the solvent power of water thus heated, far beyond its boiling point, over various animal and vegetable matters of difficult solubility. He found, that by this instrument, the firmest bones, when ground to powder, were rendered completely soluble in water, and cartilages with ease, and, in general, it may be observed, that almost all vegetable and animal matter may be thus dissolved

Digestors, or strong iron boilers with a very closely-fitting lid, are often used in the making of soups, and other economical purposes.

DIGGES, Leonard, in *Biography*, who flourished in the 16th century, was born at Digges Court, in the parish of Berham, in Kent. He finished his education at University college, where he employed his time so well, that, in the world of business, he obtained the reputation of a skilful architect and surveyor, and a profound mathematician. He was also celebrated for his practical knowledge in fortification. As an author, he bore a respectable character: his works were, 1. "Tectonicum," which treats of mensuration and surveying: this was published in 1556 in quarto. 2. A geometrical treatise, entitled "Pantometria:" this was a posthumous work, published by his son, who also gave the world an enlarged edition of the Tectonicum. 3. "A Discourse on the Platonic Bodies:" and 4. A meteorological work, entitled, "Prognostication Everlasting, of right good Effect, or Choice Rules to Judge of the Weather by the Sun, Moon, Stars, &c." This was re-published by his son, with corrections and considerable additions in 1592. He died about the year 1574, leaving behind him one son: viz.

Digges, Thomas, on whose education great pains were taken from his earliest years. At a proper time, he was sent to Oxford, where he studied with so much diligence and success, that he became, in due time, one of the first mathematicians of the age. But his knowledge was not merely theoretical: when queen Elizabeth sent assistance to the Netherlands, she appointed Mr. Digges muster-master-general; in performing the duties of this office, he not only acted the part of a faithful and excellent officer, but found means of perfecting himself in every department of military affairs. Besides being the editor of his father's works, he wrote and published several books, which obtained for him a good reputation as a scholar and man of science: but he was particularly esteemed on account of his piety, which was equal to his learning. He died Aug. 24, 1595, and was buried in the church of St. Mary, Aldermanbury, where a monument was erected to his memory. He left behind him a son: viz.

Digges, Dudley, who was born in 1583, and in 1598 he was entered at University college, Oxford, where he very much improved himself in sound learning, under the tuition of Dr. G. Abbot, who was afterwards archbishop of Canterbury. He took his degree of bachelor of arts in 1601, went and studied in the inns of court; and thence he travelled on the continent for the improvement of his mind, and in order that he might attain a skill in foreign languages. In 1618, he was appointed ambassador to the czar of Muscovy, and in two years afterwards he was joined in a commission to Holland for obtaining restitution of some property seized from the English in the East Indies. He was elected member of parliament in 1621, and he was also member of the first parliament in the reign of Charles I. In 1626, he took an active part in the impeachment of Villiers, duke of Buckingham; and for a speech which he delivered at a conference with the house of lords, he was committed to the Tower. The commons, however, vindicated his cause, and he was soon discharged from his confinement. In 1628, he was elected member of parliament for the county of Kent, and continued for some time to act with the patriotic party, but the temptation of a reversionary grant of the office of master of the rolls was greater than he could withstand. He accepted this in 1636, and from that time we hear nothing more of his public conduct. He enjoyed the emoluments of office but a short time; having obtained them in 1636, and dying March 1639. As an author, this gentleman published in 1615 "A Defence of Trade; in a Letter to Sir Thomas Smith," and after his death was published in his name, "A Discourse concerning the Rights and Privileges of the Subject." This was the substance of the speech for which he was imprisoned. Some other of his speeches may be found in parliamentary collections. He collected the letters which passed between the ministers and others respecting the projected marriages between queen Elizabeth and the dukes of Anjou and Alençon, which were published in the year 1655, under the title of "The complete Ambassador, &c." In the former editions of the Biographia Britannica, the character of this gentleman has been too highly coloured, but the editor of the last edition has summed it up in few words, and to his decision we cheerfully assent: "He appears to have been a firm, but temperate opposer of the stretches of prerogative, by which the reign of king Charles I. was so unhappily distinguished." This gentleman left a son, who proved himself a zealous friend of the court party, and wrote a work in 1643, to prove the unlawfulness of taking up arms by subjects against their sovereign, in all cases whatsoever, which has been frequently reprinted. Biog. Brit.

Digges, *Cape*, in *Geography*, a cape in the channel from Hudson's straits to Hudson's bay. N. lat. 62° 45'. W. long. 79°.—Also, a cape in Baffin's bay, called cape Dudley. N. lat. 76° 48'. W. long. 59° 7'.

DIGGING, in *Agriculture*, the operation of breaking and turning up the soil by means of a spade. In cases where labour is cheap, and a sufficient number of hands readily provided, this would be an excellent method of preparing the ground for potatoe, carrot, and other root crops of a similar kind, as the land would be loosened and broken up to a better depth than by the plough, and at the same time more effectually pulverized and reduced; in consequence of which, weeds and grass would be less apt to rise, and injure the crops.

In this method, waste lands may often be broken up and brought into tillage with great advantage and profit, in such circumstances as those which have been mentioned. The increasing price of farm-labour, however, operates greatly against the use of the spade in field-work.

Digging, in *Gardening*, the means of rendering garden ground in a proper state for having different sorts of crops sown or set upon it. This sort of work should constantly be performed as nearly as possible to the time of putting in the seeds or plants, as in this state a sort of new fermentation takes place in the soil, by which heat is evolved, and other materials necessary for the growth of the crops formed and provided in it.

In cases where the intention is chiefly that of bringing the ground into a suitable state of reduction and mellowness of mould, it is only necessary to have the business of digging executed

executed in the autumnal or winter feafons, being well ridged or laid up, fo as to be fully expofed to the action and influence of froft and other caufes, and be thereby brought into a proper condition for being levelled down and fown or planted upon in the early fpring months.

It is a beneficial practice in fome cafes, in order to bring new land of this fort into a fuitable ftate of preparation for the reception of crops, particularly where the under ftratum or fub-foil is of the more rich friable kind, to have it trenched over, paring off the furface, and turning it to the bottom, to be covered by the earth from below; but this fhould never be attempted, except for tap-rooted plants, where the under foil is of a ftiff unfriendly nature, as by fuch means the bed for the immediate reception of the feeds or plants muft become very unfit for their growth; while the more rich furface vegetable material, will be placed out of their reach and be loft.

Work of this kind may be performed either in the autumnal or fpring months, but the former is moftly the better; in the more adhefive foils, however, it fhould always be performed when the weather is dry, as under other circumftances the mould is liable to become lumpy and uneven, and of courfe unfit for the putting in of crops.

In the performance of the firft mode, or that of plain digging, the workman proceeds by beginning at one end of the piece of ground, forming a trench quite acrofs, to the depth of fix or eight inches, or deeper where neceffary, and the fame width, conveying the earth taken out to the oppofite end, where the digging is to finifh; then proceeding with a fecond courfe acrofs as before, turning the different fpits of earth in a clean, neat, even manner into the former opening, continuing the fame regular courfes, till the whole is dug over, breaking and reducing the lumps and clods as much as poffible, being careful to preferve a level even furface, having a proper regard to fuch hollows as may be prefent. The earth taken out from the firft opening or trench will ferve to fill up and render the laft even and level; and when dung is applied, it may either be fpread evenly over the furface and be regularly turned in, or placed in the hollow or trench, and covered by the digging of the following trench. This is much the beft practice where the dung is of the long or littery defcription. As the bufinefs of digging proceeds the roots of different forts of perennial weeds, as twitch, bear-bind, and others of a fimilar kind, fhould all be carefully picked out, as they multiply exceedingly by being divided; and thofe which are upon the furface of the ground be well turned to the botton of the former trench.

But in the latter, or trench method of digging, the ufual practice is to begin at one end of the piece of ground, and form or open by a line and the fpade, a trench two fpits wide, to the depth of one or two, removing the earth thus taken out to the contrary end, as noticed above, for the purpofe of filling up the laft trench; then to form a fecond trench in the fame manner after having pared off the furface, and placed it in the bottom of the former; proceeding in the fame way till the whole is trenched over. In this mode it is the cuftom to fhovel up and take out the reduced mould or crumbs from the bottoms of the trenches in each courfe of digging. In executing the labour in this manner of digging, the workman ftands with his fide to the trench, while in the former cafe he faces it. This practice is particularly ufeful, where the ground is much infefted with weeds, and where the foil is ftiff, or not of great depth. The dung, in this method of digging, where it is performed to the depth only of one fpit, may be depofited in the bottom; but where two fpades' depth are ufed, it fhould be put in upon the firft fpit, after it has been dug off, and placed in the bottom of the former trench, as in this way it will not be buried to too great a depth, which, under other circumftances, would be the cafe.

And the trench digging of garden ground may likewife be performed either in a level furface, as in the common manner of digging, or in the rough ridged mode: the former is the beft method where immediate fowing is intended; but the latter commonly where the land is to remain fome time previous to its being cropped, as by this means it will derive the moft advantage from the influence of the atmofphere and the action of froft, and be more fully reduced in its particles, fo as to only require levelling down at the time of fowing or putting in the crops. In cafes, however, where the foils are of a light thin gravelly, or fandy quality, as they are apt to part with their moifture too quickly, and do not ftand much in need of pulverization, it would appear the beft method to dig them conftantly in the plain or level manner, as by fuch means the effects of exhalation and the diffipation of their moifture may be the moft effectually counteracted.

All forts of digging and levelling down of garden ground fhould likewife, efpecially in the ftiffer forts of foil, be executed, when the land is in a condition fomewhat inclining to drynefs, as it can never be done to benefit when in a moift cloggy fituation.

Digging in *Mining*. See Mining.

DIGHTON, in *Geography*, a poft-town of America, in the ftate of the Maffachufetts and county of Briftol; feven miles from Taunton, and 20 from Warren, in Rhode ifland. The townfhip contains 236 houfes, and 1666 inhabitants.

DIGIT, Digitus, in *Anatomy*. See Finger.

Digit, in *Arithmetic*, fignifies an integer, or number under ten; as 1, 2, 3, 4, 5, 6, 7, 8, 9.

Digit, in *Aftronomy*, is the meafure by which we eftimate eclipfes: amounting to the twelfth part of the diameter of the luminary eclipfed.

The diameter of the body, or difk, of the fun or moon, is divided into twelve parts, called digits; and an eclipfe is faid to be of ten digits, when ten of thofe parts are hid. Thefe digits, Wolfius, and fome others, call digits eclipfed. When the luminary is juft wholly covered, the digits eclipfed are precifely 12; and when it is more than covered, which is frequently the cafe in lunar eclipfes, then more than 12 digits are faid to be eclipfed.

Digit is alfo a meafure taken from the breadth of the finger. A digit is properly three-fourths of an inch, and equivalent to four grains of barley, laid breadth-wife, fo as to touch each other.

DIGITALIS, in *Anatomy*, a term applied to the arteries and nerves of the fingers and toes.

Digitales *Volares Arteriæ*, are three branches arifing from the arcus fuperficialis volæ of the ulnar artery: fee Arteries, *Defcription of.*

Digitales *Pedis*, are three fimilar arteries in the foot, given off from the arcus plantaris profundus. See Arteries.

Digitales *Nervi*, or the nerves of the fingers, are of two claffes. The thumb, and each finger, has a large branch running along both its radial and ulnar fide, towards the palmar furface, to the extremity of the organ. Thefe larger digital nerves are produced by the median and ulnar trunks, and accompany the digital arteries. The former of thefe trunks fends two branches to the thumb, two to the fore, and two to the middle finger, and one to the radial fide of the ring finger. The ulnar fide of the latter finger, and both fides of the ring finger, are fupplied from the ulnar nerve. The dorfal furfaces of the fingers have a fimilar fup-

ply of two nerves each; but they are fmaller. Thofe of the thumb, fore, and middle fingers, and radial fide of the ring finger, are fupplied from the dorfal branch of the radial nerve; while the remainder are produced from the dorfal branch of the ulnar nerve.

In the foot the plantar digital nerves are derived from the two plantar branches of the pofterior tibial nerve; and the dorfal nerves from the fuperficial peroneal nerves. See Nerves.

DIGITALIS, in *Botany*, (from *digitale*, the finger of a glove. The name appears firft to have been given by the German writer Fuchs or Fuchfius, and hence the plant, being called *Digitalis Fuchfii*, feems to have acquired its Englifh appellation, there being, as far as we can difcover, no other name for it in our language.) Fox-glove. Fuchf. Hift. 892. Linn. Gen. 313. Schreb. 410. Willd. Sp. Pl. v. 3. 283. Sm. Fl. Brit. 665. Juff. 120. Gærtn. t. 53. Clafs and order, *Didynamia Angiofpermia*. Nat. Ord. *Luridæ*, Linn. *Scrophulariæ*, Juff.

Gen. Ch. *Cal.* Perianth in five deep, ovate or rounded, permanent fegments; the upper one narroweft. *Cor.* of one petal, bell-fhaped; tube large, inflated, bellying beneath, contracted at the bafe; limb fmall, unequally four-cleft, either obtufely or acutely; the upper lobe often cloven, the lower largeft. *Stam.* Filaments four, inferted into the tube of the corolla, tapering at each end, bent, two of them longer than the others; anthers incumbent, in two diftinct, pointed lobes. *Pift.* Germen fuperior, pointed; ftyle fimple, parallel with the ftamens; ftigma fmall, acutely cloven. *Peric.* Capfule ovate, pointed, the length of the calyx, with two cells, and two valves, whofe inflexed edges form the double partition, but the valves fplit externally as well as at the fummit. *Seeds* very numerous, fmall, obovate, but fomewhat angular, and rough.

Eff. Ch. Calyx in five deep fegments. Corolla bell-fhaped, five-cleft, inflated. Capfule ovate, of two cells with many feeds.

1. D. *purpurea*, Purple Britifh Fox-glove, is the fpecies beft known. Linn. Sp. Pl. 866. Engl. Bot. t. 1297. Curt. Lond. fafc. 1. t. 48. Woodv. Med. Bot. t. 24. Fuchf. Hift. 893. Ger. em. 790. "Segments of the calyx ovate, acute. Corolla obtufe; its upper lip undivided. Leaves downy." It occurs in various parts of Europe on a dry chalky, loamy or gravelly foil, and is very abundant and magnificent about hills and the borders of fields or woods in the north of England, flowering in June and July. It is frequently kept for its beauty in gardens, and fows itfelf plentifully, if the fituation be dry, without requiring any care. The root is biennial. Stem erect, three or four feet high. Leaves large, ovate, crenate, downy. Flowers very numerous, in a long fimple fpike, large, crimfon, fometimes white, elegantly fprinkled with eye-like fpots within. The whole herb when bruifed has a bitter, naufeous, and virulent flavour, and is one of the moft dangerous of our native plants, acting violently on the ftomach and bowels, and affecting the nerves by its narcotic powers. Hence it lowers the pulfe, affects the fpirits in a moft painful manner, and is ftrongly diuretic. Some of the above qualities render it a valuable medicine, in careful hands, in dropfical, confumptive, or epileptic cafes. It is faid to be ufeful as an external application to fome forts of ulcers. 2. D. *minor*, a native of Spain, much refembles the foregoing, but is fmaller, with fmooth leaves, and a more evident notch in the upper lobe of the flowers. 3. D *Thapfi*. Linn. Sp. Pl. 284. Sm. Exot. Bot. t. 43. "Segments of the calyx oblong. Corolla obtufe, its upper lip undivided. Leaves downy, decurrent." A native of Spain and Italy. This had been long loft to our gardens, and was but little known to fcientific botanifts, till Mr. Lambert obtained it from Spain. It is a tolerably hardy perennial, and is cultivated with great fuccefs at Kew. 4. D *lutea*. Jacq. Hort. Vind. t. 105 "Segments of the calyx lanceolate. Corolla acute; its upper lip cloven." Grows in France and Italy, and has a long denfe fpike of fmall yellow flowers, and fmooth leaves. It is a hardy perennial of no great beauty. 5 D. *ambigua*. Linn. Suppl. 282. (D. lutea; Fuchf. Hift. 894. D. ochroleuca; Jacq. Auftr. t. 57.) "Segments of the calyx lanceolate. Upper lip of the corolla emarginate. Leaves downy beneath." Found in Auftria, Switzerland, and Germany. A very pretty perennial fpecies, with elliptical denticulated leaves, and ftraw-coloured flowers, beautifully fpotted within. It feems to have been long overlooked or not well underftood by Linnæus, who never faw it alive. The name given by Jacquin is preferable to that which has been retained.

There are feveral more of this genus, which refemble each other in their narrow, fmooth and rather rigid foliage; as D. *ferruginea*; D *obfcura*, Jacq. Hort. Vind. t. 91. D. *parviflora*; ibid. t. 17; D. *lanata*, Ehrh. Beitr. fafc. 7. 152, fuppofed to be a native of Hungary, and introduced by Dr. Smith to the Britifh gardens in 1790; and another unfcientifically named *orientalis* (D. orientalis, tragopogi folio, flore albido, Tourn. Cor. 9,) which ought to have been called D. *fpatulata*: it was found by Tournefort in Armenia, and is neareft allied to the *lanata*.

Another tribe of fpecies are natives of a warmer climate, and have tall fhrubby ftems, broader and ferrated leaves, and handfome orange-coloured flowers; as D. *canarienfis*, Mill. Ic. t. 120; and D. *Sceptrum*, Sm. Exot. Bot. t. 73. Thefe are greenhoufe plants, and well worthy of cultivation. They are propagated by feeds, and require only to be kept from froft, being natives of Madeira and the Canary iflands.

Some other fpecies of this fine genus are ftill not at all or imperfectly defcribed. A complete illuftration of it, with coloured figures, has long been expected from the exquifite pencil of Mr. Ferdinand Bauer, who in his travels to Greece, with Dr. Sibthorp, faw many of the plants wild, and attended to them with this object in view. They make a fplendid part of the drawings deftined for the *Flora Græca* S.

Digitalis, in the *Materia Medica*. Though this valuable plant has ftood on the lift of the Materia Medica for feveral centuries, it may be faid to have been brought into notice, at leaft among regular practitioners, almoft entirely by the late Dr. Withering. This excellent phyfician was induced, in the year 1775, to make a trial of digitalis in the cure of dropfies, (in confequence, indeed, of finding it mentioned in a popular recipe againft this difeafe,) and the fuccefs attending this practice was fo marked, that after inveftigating the properties of this plant for ten years, he gave the refult of his experience in a very valuable treatife, publifhed in 1786.

Since this period the fingular properties of digitalis have been further inveftigated by Darwin, Beddoes, Ferriar, Hamilton, and many other inquiring men, all of whom have entirely confirmed Dr. Withering's ftatement in almoft every particular; and in fact, though the ufe of this vegetable has been extended to many other difeafes, little has been added to the knowledge of its general properties fince Dr. Withering's treatife.

Digitalis poffeffes two very ftriking properties, which in no other fubftance are found combined, (at leaft not in any confiderable degree,) and to which are to be referred all the benefits derived from its ufe in various difeafes. One of thefe

these properties is a most surprising diminution in the strength, and especially in the frequency, of the pulse, a diminution which extends not only to the reduction of an inordinate vascular action to the bounds of health, but even to bring it to a most unusual and preternatural depression; and if persisted in, finally to destroy life. Under the use of the digitalis, cautiously administered, a strong pulse of the usual, or of increased quickness, will frequently sink as low as forty beats in a minute, and sometimes much less, without intermitting; and when once so reduced, the same effect may be steadily kept up for many days by a less dose than that which at first reduced it. But if it be thrown into the constitution too suddenly, or if the quantity be too great, a most distressing and alarming anxiety at the heart, fainting, giddiness, coldness of the extremities, pain of the head and temples, failure and irregularity of pulse, incessant vomiting, and extreme debility will follow, and thus it may prove fatal.

The other effect of digitalis, is that of a very powerful diuretic; and it may be remarked that it seldom, if ever, acts in this manner, without a concomitant reduction of the frequency of the pulse; and hence it is that the exhibition of this medicine, as a diuretic, requires so much caution, lest the debility attendant on the sudden diminution of the vascular action should overset a constitution already weakened and oppressed by dropsical effusion.

In the use of digitalis, particular care must be taken not to increase the quantity or frequency of dose too rapidly, as it often happens that no effect is produced for the first doses; but when a considerable quantity has been taken, very violent symptoms are apt to follow so suddenly, as scarcely to allow time for any indication of the necessity of forbearance of this powerful medicine. This is particularly the case when the form of infusion is adopted.

There are some constitutions, however, on which the digitalis, even in its most active state, appears to have no manner of effect, whatever be the dose, either on the pulse, or the flow of urine, or on any other function of the body.

Considerable attention is required in the selection and preparation of the digitalis for medicinal use. Dr. Withering's useful directions, dictated by long experience, ought to be carefully adhered to. The leaves are to be gathered when the flower stems are shot up, but before the time of flowering; and the largest and deepest coloured leaves are preferable. These are to be carefully dried in a warm room, through which a current of air is passing; and when completely crisp and dry, they are to be reduced to powder, and kept in bottles closely corked, and not exposed to the light. In this state the digitalis has a fragrant smell, not unlike new hay. The dried plant, well kept, will preserve its virtues for a considerable time, but as an uniformity in strength is always desirable; and as all herbaceous plants gradually lose their medicinal properties, it will be right for the apothecary to prepare it afresh every year.

The digitalis is prescribed in three different forms, in powder, in tincture, and in infusion. The latter mode is preferable, when the full diuretic powers of the plant are wanted, as it acts with the most speed and certainty. The infusion recommended by Dr. Withering, and which is that commonly employed, is one drachm of the dried leaves, infused in eight ounces of boiling water to seven ounces, to which, when strained one ounce of any aromatic spirit is added. The first dose of this infusion to an adult, may be about half an ounce three times a day; and the quantity may be gradually increased by about a drachm daily, till the desired effect follows, unless the reduction of the pulse, and the other symptoms, arise to an alarming degree.

The powder may be given mixed with an aromatic, in doses of about half a grain thrice a day, the quantity being gradually increased. When the digitalis is used for coughs and chronic complaints, where the sedative power alone, and not the diuretic is wanted, the powder is often made into a pill, sometimes combined with opium, or other remedies.

Dr. Ferriar has found the diuretic effect increased by combining it with calomel, and the pulvis ipecac. comp.; the dose for an adult being half a grain of digitalis, a grain of calomel, and eight grains of the p. ipec. c. in two pills.

Dr. F. observes, that when the digitalis succeeds as a diuretic, it is generally in a few days; so that if it does not speedily shew its effects, it is only a waste of time to continue it longer.

The tincture of digitalis, recommended by Dr. Darwin, is made by digesting two ounces of the dried leaves, coarsely powdered, in eight ounces of proof spirit for some days. The quantity of the plant here recommended is so great, as to soak up a great portion of the liquor, and strong pressure is required to obtain it separate. The Edinburgh college use a tincture with only an ounce of digitalis to eight ounces of the spirit. The medium dose of the stronger tincture to an adult, is at first no more than eight or ten drops; but it often must be increased to many times this quantity, before any sensible operation is produced.

In employing the digitalis, therefore, very accurate attention should be paid to those symptoms which we have already enumerated as following an exorbitant dose; and especially the state of the pulse should be exactly noted as affording the safest guide to the practitioner. Where this medicine acts at all on the constitution, the pulse is almost invariably reduced in frequency, so that the digitalis may be safely given in increasing doses till this effect is produced, after which point it will hardly be prudent to make a further increase, and the medicine must be discontinued as soon as the pulse becomes irregular, intermitting, or when other marks of alarming debility come on. This, however, principally applies to the use of digitalis as a diuretic in the cure of dropsical effusions of various kinds, where the full effect of this powerful plant is wanted; for in most other occasions it will seldom be requisite to push it so far.

We may just enumerate the diseases for which this excellent medicine has been employed with advantage. In dropsy of every kind, except the encysted, this medicine is often singularly useful; and when properly dosed, it evacuates the water with less disturbance to the system than any other diuretic. Like all other medicines of this class, however, it frequently fails to produce any effect without any obvious reason for such failure, though not more frequently than any other medicine. In hydrothorax, either in its most decided form, or where the effusion into any part of the cavity of the chest is only indicated by dyspnœa, this medicine is often of singular utility, and under its operation the pulse resumes its regularity, and increases in strength, unless the medicine be continued too long, or in too large a dose.

In the above-mentioned diseases, the benefit derived from the digitalis is chiefly owing to its diuretic powers, though not entirely so, since some advantage is attributable (especially in effusions into the cavity of the chest) to the diminution of the force of circulation.

There are many other cases, however, in which the advantage derived from this medicine may be almost entirely referred to its power of reducing the force of the circulation. We have long wanted a remedy (as Dr. Ferriar justly observes) capable of lowering the pulse, without increasing evacuation to a dangerous degree. Hitherto we have only been able to effect it, either by withdrawing a quantity of the

the circulating fluids fuddenly, or by producing naufea. The digitalis is therefore an invaluable remedy in enabling the phyfician in moft cafes to accomplifh this object; and this circumftance has led to its employment in that moft formidable and leaft curable of all difeafes, pulmonary confumption.

The fuccefs which has attended this practice has been very various; many well marked and fully authenticated cafes have been recorded, in which all the fymptoms that characterize incipient pulmonary confumption, pain of the fide, frequent rigors, fhort cough, bloody and puriform expectoration, a rapid pulfe, a parched fkin, and great proftration of ftrength, have been entirely removed by digitalis given in dofes to affect the pulfe, and after the ufual antiphlogiftic remedies, and the patients have entirely recovered. It appears, however, that though a confiderable number of thefe cafes have received benefit from digitalis, yet, where the fymptoms have fo far advanced as to be unequivocal in their nature, the benefit has not been permanent; and, on the whole, it may be fafely affirmed, that the chance of fuccefs with this powerful medicine is much lefs in pulmonary inflammation and fuppuration than in dropfical effufions in any part of the body. There frequently occurs, however, in delicate, irritable habits, a flight hæmoptyfis, attended with cough, pain in the fide, a quickened pulfe, and confiderable debility, in which the fymptoms are fufficient to excite alarm for the fafety of the lungs, though neither dyfpnæa nor purulent expectoration are prefent. In fuch cafes blifters and expectorants are ufually employed, and it is in thefe that the digitalis has been ufed with the happieft effect, given in fuch dofes as juft to affect the pulfe and keep it within its natural ftandard. The tincture is the preparation generally preferable in this cafe, as it is, on the whole, more manageable than the infufion, and more certain than the powder.

Not only hæmoptyfis, but other hemorrhages are often relieved by digitalis, particularly menorrhagia, in which this medicine is peculiarly indicated, on account of the great debility occafioned by the frequent recurrence of this diftreffing complaint, which forbids the ufe of an active antiphlogiftic plan.

Digitalis has alfo been found of fingular fervice in fpafmodic afthma, efpecially when combined with opium, and in meafles, particularly in the latter ftages of this difeafe. Many other inftances will occur to the judicious practitioner in which this fingularly powerful medicine may be tried with rational hopes of fuccefs.

DIGITALIS *Ferruginea*, in *Botany*. Dr. Plot, (Nat. Hift. of Staffordfhire, p. 196.) has defcribed a foffil remain of fome kind, which prefents many, but not all, of the characteriftic forms of the feed-veffel of this fpecies of plant: but the fame ought, more properly, to be confidered as an animal remain.

DIGITATUM FOLIUM. See LEAF.

DIGITI *indicis manus abductor*,
DIGITI *indicis pedis abductor*,
DIGITI *medii pedis abductor*,
DIGITI *minimi manus abductor*,
DIGITI *minimi pedis abductor*,
} in *Anatomy*. See ABDUCTOR.

DIGITI *minimi manus adductor*,
DIGITI *minimi pedis adductor*,
} See ADDUCTOR.

DIGITI *minimi manus extenfor proprius*. See EXTENSOR.

DIGITI *minimi manus flexor proprius*,
DIGITI *minimi pedis flexor brevis*,
} See FLEXOR.

DIGITORUM *manus extenfor communis*,
DIGITORUM *pedis extenfor brevis*,
DIGITORUM *pedis extenfor longus*,
} See EXTENSOR and FLEXOR.

DIGITORUM *manus flexor perforans*,
DIGITORUM *manus flexor perforatus*,
DIGITORUM *pedis flexor acceſſorius*,
DIGITORUM *pedis flexor brevis*,
DIGITORUM *pedis flexor longus*,
} See EXTENSOR and FLEXOR.

DIGITUS, is the term ufually given to the fingers and toes. Digitus *index* is the fore-finger; *medius*, the middle finger; *annularis*, the ring-finger; and *minimus*, the little finger. The toes are generally defignated by the names of digitus primus, fecundus, &c. beginning with that which is next to the great toe.

DIGITUS *Veneris*, *Venus's finger*, in *Botany*, a name by which fome authors have called the nymphæa, or water-lily.

DIGLIGGY-NEUR, in *Geography*, a town of Candy, in the ifland of Ceylon, next in importance to Candy, lies to the eaftward of the capital about 10 or 12 miles, and in the direction of the Englifh fort Batacolo. The diftrict around it is more wild, barren, and impenetrable, than that which furrounds Candy; on this account it has been fometimes chofen as a royal refidence. At one period, when the king was driven out of Candy, and his capital burnt, he found here a retreat to which no European army has ever been able to penetrate. A few villages are fcattered among the neighbouring hills: and in thofe places where the woods have fome clear fpace, the foil, though very poor, produces rice.

DIGLITO, or DIGLATH, in *Ancient Geography*, a torrent of Afia, whofe fource is in the fountain of the Tigris, in the eaftern part of the mountains of Niphates; it runs from north-eaft to fouth-weft, and difcharges itfelf into the lake Arethufa.

DIGLYPH, from δις, *twice*, and γλυφω, *I engrave*; a kind of imperfect triglyph, confole, or the like, with only two channels, or engravings, inftead of three. See TRIGLYPH.

DIGNAC, in *Geography*, a fmall town of France, in the department of the Charente; nine miles S. of Angoulême.

DIGNANT, a town of Venetian Iftria, about a league from the fea. N. lat. 45° 10′. E. long. 13° 14′.

DIGNE, in Latin *Dinia*, or *Digna*, a fmall but handfome town of France, in the department of the Lower Alps, chief place of a diftrict, fituated in a rich valley on the river Bléonne, which, not far from thence, falls into the Durance, 552 miles S. of Paris, and 42 S. by W. of Embrun. Lat. 44° 5′.

Digne is a very ancient town. Cæfar, in his Commentaries, calls it "Digna, inter montes pofita, &c." At the diftance of one kiliometre is a mineral bath, celebrated for the wonderful cures which it performs in cafes of anchylofis, or that ftiffnefs which often takes place in a limb cured of a wound produced by a gun or piftol-fhot. All the fprings in the neighbourhood of Digne are hot; the temperature of the water varies from 30 to 40 degrees of Réaumur's thermometer. It is taken externally and internally, but it has not yet undergone an exact chemical analyfis; it evidently contains much fulphur and alkali, as it emits a very difagreeable fmell. Taken internally it operates as a ftrong purgative. On the mountains from which the water iffues the ferpents have no venom, and children may play with them with impunity, whilft thofe which are found but at a fmall diftance from the fprings, bite, and are venomous. Thefe mountains abound with curious petrifications; the crater, of an extinct volcano, is diftinctly vifible on the top of one of the higheft.

The town of Digne contains 2872, and the canton 10,362 inhabitants, difperfed in 31 communes upon a territorial extent of 522½ kiliometres. As chief place of a diftrict Digne

has

has a fub-prefect, a court of juftice, a regifter office, a revenue infpector, and a ranger. It is the fee of a bifhop.

The diftrict of Digne is compofed of eight cantons, and has a population of 46,807 individuals, a territorial extent of 2480 kiliometres, and 88 communes. The foil produces corn and an abundance of excellent fruits, which are fent to different parts of France, Italy, and Germany. There is much grafs-land and a great number of vineyards. The manufactures are thofe of hardware, cutlery, houfehold furniture, and leather. The diftrict contains likewife a mine of copper, in which gold and filver are frequently found: it is near Verdêche. In the neighbourhood of Mouftiers a very fine clay is dug, of which they make excellent potter's ware. (Herbin Statiftique de la France.)

DIGNITARY, in the *Canon Law*, a perfon who holds a dignity, that is, a benefice which gives him fome pre-eminence in the choir above mere priefts and canons Such is a dean and archdeacon, though the word is now abufively applied to a mere prebendary or canon.

Dignities are fometimes fimple, fometimes with cure of fouls, and fometimes with jurifdiction and adminiftration of facred things. The canonifts even define dignity, "adminiftratio cum jurifdictione & poteftate conjuncta." If the dignity have no contentious or exterior jurifdiction, it is a fimple parfonage, and only gives pre-eminence. See BENEFICE, PARSONAGE, &c.

Of dignities, including prebends, Camden reckons in England 544 in number.

DIGNITY, a quality that denotes a man (*dignus*) worthy.

DIGNITY, in its moft ufual acceptation, fignifies honour and authority, reputation, &c.; and dignity may be divided into fuperior and inferior; as the titles of duke, marquis, earl, vifcount, baron, &c. are the higheft names of dignity; and, after the nobility, the firft perfonal dignity is a knight of the garter; next after certain official dignities, as privy counfellors, the chancellors of the exchequer and duchy of Lancafter, the chief juftice of the king's-bench, the mafter of the rolls, and the other Englifh judges, follow a knight banneret, baronets, knights of the bath, and knights bachelors. Thefe, fays fir Edward Coke, (2 Inft. 667.) are all the names of dignity in this kingdom, efquires and gentlemen being only names of worfhip. But before thefe laft the heralds rank all colonels, ferjeants at law, and doctors in the three learned profeffions. See PRECEDENCE.

Nobility only can give fo high a name of dignity as to fupply the want of a furname in legal proceedings; and as the omiffion of a name of dignity may be pleaded in abatement of a writ, &c. fo it may be where a peer who has more than one name of dignity is not named by the moft noble. 2 Hawk. P.C. 185. 230. No temporal dignity of any foreign nation can give a man a higher title than that of efquire. 2 Inft. 607.

DIGNITY, in *Oratory*, that part of elocution, which confifts in the right ufe of tropes and figures. It is not fufficient for an orator to exprefs himfelf with propriety and clearnefs, or in fmooth and harmonious periods; but his language muft be fuited to the nature and importance of the fubject. As elegance gives rules for the firft of thefe, and compofition for the fecond, dignity does the fame for the laft of them. This neceffary variety of expreffion arifes, in a great meafure, from tropes and figures, which not only enliven and beautify a difcourfe, but likewife give it force and grandeur; for which reafon this part of elocution feems to have been called *dignity*. See FIGURE and TROPE.

DIGOIN, or DIGOUIN, in *Geography*, a fmall town of France, in the department of Saône and Loire, chief place of a canton, in the diftrict of Charolles; 12 miles W. of Charolles, with a population of 2233 individuals. The canton has five communes, with 5352 inhabitants, upon a territorial extent of 90 kiliometres.

DIGOVILLE, a fmall town of France, in the department of La Manche; 3 miles E. of Cherbourg.

DIGRESSION, in *Oratory*, is defined by Quintilian, agreeably to the etymology of the word, to be a going off from the fubject we are upon to fome different thing, which, however, may be of fervice to it. Inft. Or. lib. iv. cap. 3.

Digreffion is not a neceffary part of a difcourfe, though it may fometimes be convenient on feveral accounts; as where a fubject is of itfelf flat and dry, and requires clofe attention; in this cafe, it is of ufe to relieve the mind by fomething agreeable and entertaining. But as it fhould never be introduced without fufficient reafon, it fhould never be too frequent, nor too long. Digreffions in hiftory, when rightly managed, afford the reader both delight and profit. Although they fhould neither be too long nor too frequent; yet now and then to introduce a beautiful defcription or fome remarkable incident, which may give light to the fubject, is fo far from an interruption, that it is rather a relief to the reader, and excites him to go on with greater pleafure and attention. Ward's Or. vol. i. p. 283, &c. vol. ii. 279.

DIGYNIA, in *Botany*, (from δι or δις, *double*, and γυνη, *a female*,) the name of fuch Orders, in the principal Claffes of the Linnæan artificial fyftem, as are characterized by two ftyles in each flower, or, where the ftyles are wanting, two feffile ftigmas. The principal of thefe Orders are the *Triandria Digynia*, and *Pentandria Digynia*, the former confifting entirely of the very natural order of true Graffes, the latter of no lefs natural a tribe, the Umbelliferous plants, though thefe laft do not occupy the whole artificial order. In the Claffes *Icofandria* and *Polyandria*, the ftyles, if more than one, and lefs than ten, are very uncertain in number, fo that it is found beft in thefe inftances to collect feveral Linnæan orders into one, they being, moreover, very fmall. Some plants are called digynous, in Linnæan language, and others trigynous, though their ftyle is fimple, thofe terms applying to their two or three ftigmas, as in *Carex*, in which fenfe, the great natural clafs *Syngenefia* is likewife digynous. Some late writers on the genus *Carex* have undertaken to correct this trifling inaccuracy, by fubftituting the term *flores diftigmatici*, which is certainly more correct, but far lefs commodious and concife. Such faftidious accuracy applied to many graffes would lead to more trouble than utility, for fome have a ftyle, or ftyles, others none, which analogy and common fenfe fhew to be of no moment as to generical or claffical diftinction. S.

DIHELIOS, from δια, *through*, and ἡλιος, *fun*, in the *Elliptical Aftronomy*, a name which Kepler gives to that ordinate of the ellipfis, which paffes through the focus wherein the fun is fuppofed to be placed.

DII, in *Ancient Geography*, a people of Thrace, placed by Thucydides in the province of Rhodope.

DII *Adfcriptitii*, in *Mythology*, a clafs of deities of lower rank and dignity. See DII *Indigetes*.

DII *Averrunci* were, among the Greeks, the fame with the alexicaci, or apopompæi, or apotropæi. Among the Egyptians thefe deities were reprefented in a menacing pofture, and fometimes with whips in their hands. Of this kind was Ifis. Their bufinefs was to avert misfortunes. Apollo and Hercules belonged to this clafs of deities among the Greeks, and Caftor and Pollux among the Romans.

DII *Confentes*, gods of the firft rank and order. See CONSENTES.

DII *Indigetes*. See INDIGETES.

Dii *Manes.* See Manes.

Dii *Nixii.* See Nixii.

Dii *Olympii*, Olympian gods, the name given by the Athenians to the twelve chief deities, to whom they had dedicated a very magnificent altar.

Dii *Patrii*, among the Romans, were the three fupreme deities, Jupiter, Juno, and Minerva. They were firft received over all the Eaft, and afterwards, fucceffively, in Greece and Italy. They are defcribed as indigetes by Virgil, Georg. i. ver. 499, and as noftri by Juvenal, Sat. iii. ver. 145.

DIJAMBUS, in *Poetry*, the foot of a Latin verfe of four fyllables; it is compounded of two iambics, as *fĕvērĭtās*.

DIJON, in *Geography*, an ancient and confiderable town of France, in the department of the Côte d'Or, chief place of the department, and of a diftrict of the fame name, fituated in an agreeable plain between the river Ouche on the fouth, and a ftreamlet, called Sufon, on the north, 228 miles S.E. of Paris, 60 N.E. of Autun, 63 W. of Befançon, 138 N. of Lyons. It contains many remarkable ancient and modern buildings, feveral of which are of an aftonifhing elevation and boldnefs. St. Mary's, or the church of our lady (Notre Dame), is a Gothic edifice, of exquifite tafte and uncommon lightnefs and delicacy. It was raifed in the 13th century. The galleries have fmall columns of two decimetres in diameter, and from five to ten metres high, all of a fingle block. The arch is particularly admired, and the whole conftitutes an unparalleled mafter-piece of architecture. The cathedral is equally remarkable for its grandeur and beauty. The fpire is nearly 400 feet high. Behind the choir of this church is an ancient rotunda with three arches, one above the other, with a circular opening in the middle, and fupported by 104 columns, the fhaft of which is of a fingle ftone. A third of this edifice is buried under ground; it is the ruin of a Pagan temple.

Dijon is the native city of Boffuet, Crebillon, and Piron. It is divided into three fections, which form each a feparate canton, one of which comprifes 13 communes, and 11,864 inhabitants, the other 17 communes, and 12,175 inhabitants, and the third 14 communes, and 11,939 inhabitants. upon a territorial extent of $497\frac{1}{2}$ kiliometres. The town itfelf has altogether a population of 21,000 individuals. Its principal manufactures are thofe of woollen ftuffs, hofiery, play-cards, leather, wax-candles, muftard, fweet-meats, and a cotton fpinnery.

As chief place of the department and of a diftrict, Dijon has a prefect, four courts of juftice, and a regifter office. It is the fee of a bifhop.

The principal trade of the diftrict is with corn and cattle, but chiefly with wine, which is fent to Paris, Strafbourg, Holland, and Switzerland. The produce of a French arpent in wine averages in this diftrict a net profit of 89 French livres. It yields Burgundy of the very firft quality.

The population of the diftrict of Dijon amounts to 122,532 individuals, difperfed in 14 cantons, and 270 communes, upon a territorial extent of $3112\frac{1}{2}$ kiliometres. N. lat. 47° 19'. E. long. 4° 57'. Herbin Statiftique de la France.

By obfervations of four years, ending in 1781, the temperature of this town is 52° 8'. The ftandard temperature is 55.°3; the difference 2.5; but the diftance of Dijon, from the ftandard, is 260 miles, which gives a diminution of 1.7 degrees. It is cooled fomewhat farther, by a ridge of mountains to the weft of it, and the chain of Jura, about 60 miles to the eaft. Kirwan's Eftimate of the Temperature of Places, &c. p. 80.

Dijon was founded by the emperor Aurelian, when he vifited Gaul, which, in its origin, was a caftle, and not a city.

DIIPOLIA, Διιπολεια, in *Antiquity*, an Athenian feftival, celebrated in honour of Jupiter Polieus, or protector of the city. For the ceremonies obferved at this folemnity, fee Potter's Archæol. Græc. lib. ii. c. 20. tom. i. p. 381.

DIKE, in *Agriculture*, a name frequently applied to a ditch. It likewife fignifies a dam, or mound of earth, raifed to prevent inundations; and fometimes even a water-ditch ufed as a divifion-fence.

The word feems formed from the verb, *to dig;* though others choofe to derive it from the Dutch, *diik*, a dam, fea-bank, or wall.

Dike, or *Dyke*, alfo denotes a work of ftone, timber, or fafcines, raifed to oppofe the entrance or paffage of the waters of the fea, a river, lake, or the like.

The word comes from the Flemifh, *dyk*, or *diik*, a heap of earth to bound or ftem the water. Junius and Menage take the Flemifh to have borrowed their word from the Greek τειχος, *wall.* Guichard derives it from the Hebrew *daghah.*

Thefe dikes are ufually elevations of earth, with hurdles or ftakes, ftones, and other matters.

The dike of Rochelle is made with veffels faftened to the bottom. The dikes of Holland are frequently broke through, and large tracts of land are then drowned.

DIKOWO, in *Geography*, a town of Bohemia, in the circle of Konigingratz; nine miles E. S. E. of Gitfchin.

DILAPIDATION, a wafteful deftroying, or letting buildings, efpecially parfonage houfes, run to ruin and decay, for want of neceffary reparation.

An action lies for dilapidations, either in the fpiritual court by the canon law, or in the courts of common law; and it may be brought by the fucceffor againft the predeceffor, if living, or, if dead, againft his executors.

It is faid to be good caufe of deprivation, if the bifhop, parfon, vicar, or other ecclefiaftical perfon, dilapidates the buildings or cuts down timber, growing in the patrimony of the church, unlefs for neceffary repairs. (1 Roll. Rep. 86. 11 Rep. 98. Godb. 259.) And that a writ of prohibition will lie againft him in the courts of common law. (3 Bulftr. 158. 1 Roll. Rep. 335.) By ftatute 13 Eliz. c. 10. if any fpiritual perfon makes over or alienates his goods, with intent to defeat his fucceffors of their remedy for dilapidations, the fucceffor fhall have fuch remedy againft the alienee, in the ecclefiaftical court, as if he was the executor of his predeceffor. And alfo money recovered for dilapidation, muft be employed, by 14 Eliz. c. 11. in the repair of the fame houfes, within two years, on penalty of forfeiting double the value to the crown.

DILATATION, (from the Latin *dilatatio*,) is the enlargement of bodies after a ftate of compreffion, or in confequence of the introduction of other fubftances amongft their component particles; thus, when part of the air is drawn out of the receiver of an air-pump, the remaining air becomes dilated; thus alfo wood, paper, &c. are dilated by moifture; and all bodies are dilated by heat. See Elasticity, and Expansion.

Dilatation, in *Surgery*, denotes the laying open any orifice, or the lips of a wound wider, or the extenfion of any veffel, or the like.

This is done by an inftrument called a dilatatorium.

DILATED Vein, in *Mining*, called alfo a *flat vein*, or *ftreak*, denotes fuch a depofitory of ore as lies between ftrata, like feams of coal, and commonly occurs in argillaceous

ſtrata; it differs from a pipe-vein, in conforming to the lamina of the ſtrata inſtead of occupying an irregular cavity, approaching to an horizontal poſition.

DILATATOR *alæ naſi*, in *Anatomy*, is the name by which Cowper has deſcribed that portion of the levator labii ſuperioris et alæ naſi, which is inſerted in the cartilaginous ala of the noſe. See the deſcription of that muſcle in the article DEGLUTITION.

DILATATOR *pinnarum proprius*, is a name given by Santorini to the depreſſor alæ naſi.

DILATATOR *urethræ*, is the accelerator muſcle, which ſee.

DILATATOR *urethræ poſticus*, is a faſciculus of fibres running forwards in the perineum, from the ſphincter ani to the accelerator urinæ, and deſcribed by Heiſter as a diſtinct muſcle.

DILATORY PLEAS, in *Law*, are ſuch as are put in merely to delay the ſuit, by queſtioning the propriety of the remedy, rather than by denying the injury; whereas, pleas *to the action* are ſuch as diſpute the very cauſe of ſuit.

The former cannot be pleaded after a general imparlance, which is an acknowledgment of the propriety of the action. (See IMPARLANCE). Dilatory pleas are, 1. To the juriſdiction of the court; alleging, that it ought not to hold plea of this injury, it ariſing in Wales or beyond ſea; or becauſe the land in queſtion is of ancient demeſne, and ought only to be demanded in the lord's court, &c. 2. To the diſability of the plaintiff, by reaſon of which he is incapable of commencing or continuing the ſuit; as, that he is an alien enemy, outlawed, excommunicated, attainted of treaſon, or felony, under a præmunire, not in *rerum natura* (being only a fictitious perſon), an infant, a feme-covert, or a monk profeſſed. 3. In abatement (which ſee). Theſe ſeveral pleas were formerly very often uſed as mere dilatory pleas, without any foundation of truth, and calculated only for delay; but now by ſtatute 4 and 5 Ann. c. 16. no dilatory plea is to be admitted without affidavit made of the truth thereof, or ſome probable matter ſhewn to the court to induce a belief of its truth. And with reſpect to the pleas themſelves, it is a rule, that no exception ſhall be admitted againſt a declaration or writ, unleſs the defendant will, in the ſame plea, give the plaintiff a better, (Brownl. 139.); that is, ſhew him how it might be amended, that there may not be two objections upon the ſame account. Nor thus, by ſtatute 8 and 9 W. III. c. 31. ſhall any plea in abatement be admitted in any ſuit for partition of lands, nor ſhall the ſame be abated by reaſon of the death of any tenant. When theſe dilatory pleas are allowed, the cauſe is either diſmiſſed from that juriſdiction, or the plaintiff is ſtayed till his diſability be removed, or he is obliged to ſue out a new writ, by leave obtained from the court, (Co. Entr. 271.), or to amend and new-frame his declaration. But when, on the other hand, they are over-ruled as frivolous, the defendant has judgment of *reſpondeat ouſter*, or to anſwer over in ſome better manner. It is then incumbent on him to plead.

DILATRIS, in *Botany*, (ſo called by Bergius, from δις, *double*, and λατρις, a *ſervant* or *attendant*, as it ſhould ſeem, becauſe he found two of the anthers ſmaller than the third, and therefore he preſumed them to be inefficient, and merely an accompaniment to that. We find them, as Linnæus did, all perfect. See *Exot. Bot.*) Berg. Pl. Cap. 9. Linn. Suppl. 10. Schreb. 37. Willd. Sp. Pl. v. 1. 246. Juſſ. 59. Lamarck, t. 34. Claſs and order, *Triandria Monogynia*. Nat. Ord. *Enſatæ*, Linn. *Irides*, Juſſ.

Gen. Ch. *Cal.* none. *Cor.* Petals 6, ſuperior, ovato-lanceolate, or linear, concave, ſlightly ſpreading, equal, hairy externally, permanent. *Stam.* Filaments three, awl-ſhaped, longer than the petals, one of them ſmaller than the reſt: anthers ovato-lanceolate, with two furrows, all (as far as we can find) equal in ſize. *Piſt.* Germen inferior; ſtyle thread-ſhaped, as long as the ſmaller ſtamen; ſtigma ſimple, acute. *Peric.* Capſule globoſe, very hairy, of three cells and three valves. *Seeds* ſolitary, orbicular, compreſſed, ſmooth, vertical.

Eſſ. Ch. Calyx none. Petals ſix, regular, hairy. One ſtamen ſmaller than the other two. Stigma ſimple. Capſule inferior, of three cells and three valves. Seeds ſolitary, round, compreſſed.

1. D. *corymboſa*. Berg. Pl. Cap. 9. t. 3. f. 5. Thunb. Prod. 10. Willd. Sp. Pl. v. 1. 246. Sm. Exot. Bot. v. 1. 29. t. 16. (D. umbellata; Linn. Suppl. 101. Mart. Mill. Dict. Wachendorfia umbellata; Linn. Syſt. Veg. ed. 13. 80. Ixia hirſuta; Linn. Mant. 27. 320. 511.) Broad-petalled Dilatris. "Petals ovate. Flowers in a flattiſh hairy tuft." A native of the Cape of Good Hope, probably in a ſandy ſoil. It flowered in Meſſrs. Lee and Kennedy's hot-houſe at Hammerſmith. Root perennial, with woolly fibres. Stem ſimple, a foot high, round, downy. Leaves moſtly radical, ſheathing, two-ranked, ſword-ſhaped, ſmooth, rather glaucous, orange at their baſe. Flowers numerous, pale lilac. Stalks red, hairy. 2. D. *viſcoſa*. Linn. Suppl. 101. Thunb. Prod. 10. Willd. Sp. Pl. v. 1. 247. Mart. Mill. Dict. Narrow-petalled Dilatris. "Petals linear. Flowers in a viſcid hairy tuft." Gathered by Thunberg on the top of Table Mountain, Cape of Good Hope. It is larger than the preceding, with broader leaves, the ſtem and infloreſcence more hairy and viſcid. Petals very narrow, and extremely hairy. This is the ſpecies figured by Lamarck in his plate above quoted. 3. D. *paniculata*. Linn. Suppl. 101. Thunb. Prod. 10. Willd. Sp. Pl. v. 1. 247. Mart. Mill. Dict. Lanceolate-petalled Dilatris. "Petals lanceolate. Panicle oblong." Gathered likewiſe by Thunberg at the Cape. It is, as far as we know, a ſtranger in our gardens, like the laſt. Its flowers are ſaid to be purpliſh, with a yellow tinge, and the panicle is elongated and viſcid.

DILE, in *Botany*, a name by which ſome authors have called the iſatis or woad. Ger. Emac. Ind. 2.

DILEMMA, Διλημμα, in *Logic*, an argument conſiſting of two, or more propoſitions, ſo diſpoſed, that grant which you will of them, you will be preſſed by the concluſion.

The word is formed from the Greek δις, *bis*, *twice*, and λημμα, *ſumptio*.

A dilemma is an argument conſiſting of two contrary parts, or ſides, either of which catches the adverſary. And hence it is alſo called ſyllogiſmus cornutus, a horned ſyllogiſm, its horns being ſo diſpoſed, that if you avoid the one, you run upon the other.

It is alſo called crocodilinus, by reaſon that as the crocodile leads ſuch as follow it, into the water, and purſues ſuch as fly it, to deſtroy them; ſo, whatever the adverſary either affirms, or denies, in this kind of ſyllogiſm, is turned to his diſadvantage.

For an example: A philoſopher once diſſuaded a man from marrying, by this argument: Either the woman you marry will be handſome, or ugly; if handſome, ſhe will give you jealouſy; if ugly, diſpleaſure.

Cicero uſes this fine dilemma, to prove, that all pain is to be borne with patience: "Omnis dolor aut eſt vehemens, aut levis; ſi levis, facile feretur; ſi vehemens, certe brevis futurus eſt."

The ſame orator, by another dilemma, proves that no meſſengers ſhall be ſent to Antony: "Legatos decernitis; ſi ut deprecentur, contemnet: ſi ut imperetis, non audiet."

Nor

Nor muſt we here omit that beautiful dilemma of Tertullian, whereby he clears the Chriſtians, and accuſes Trajan, who had forbad the ſeeking them out, and yet ordered them to be puniſhed when found: "O ſententiam neceſſitate confuſam! negat inquirendos, ut innocentes; et mandat puniendos, ut nocentes: parcit et ſævit, diſſimulat et animadvertit! quid temetipſum cenſura circumvenis? ſi damnas, cur non et inquiris? ſi non inquiris, cur non et abſolvis?"

For a dilemma to be legitimate, there are two things required: 1. A full enumeration of parts; thus that of Ariſtippus above-mentioned, whereby he diſſuades from marriage, is invalid, as being defective in the enumeration; there being a middle degree, or form, between handſome and ugly.

2. That the dilemma preſs the adverſary alone, and that the perſon who makes it be not liable to have it retorted upon him. This was the caſe in that celebrated dilemma of the ſophiſt Protagoras, which the Areopagites, with all their wiſdom, were not able to reſolve.

A youth named Euathlus, engaged with Protagoras, to learn dialectics, upon condition, that he ſhould pay him a large ſum of money, the firſt cauſe he pleaded, in caſe he gained the ſame. Euathlus, when fully inſtructed, refuſing to pay the promiſed reward, Protagoras brings his action, arguing thus: You muſt pay the money, however the cauſe terminate; for if I gain, you muſt pay me in conſequence of the ſentence, as being caſt in the cauſe; and if you gain it, you muſt pay in purſuance of our covenant, and, therefore, whether the cauſe goes for me, or againſt me, you muſt pay me the reward. Nay, retorts Euathlus, which way ſoever the cauſe go, you will have nothing: for if I prevail, the ſentence gives it that nothing is due to you; and if I loſe, then there is nothing due by the covenant; and therefore, whether I gain or loſe the cauſe, I will not pay you; for nothing will be due to you. It is ſaid, that the court, unable to decide in favour of either party, ordered them both to appear in court again an hundred years afterwards, to receive judgment.

After the like manner, an ancient prieſteſs diſſuading her ſon from haranguing the people, by this dilemma, "nam ſi injuſta ſuaſeris," ſays ſhe, "habebis Deos iratos: ſin vero juſta, iratos habebis homines:" the youth thus returned the dilemma on his mother: "imo," ſays he, "expedit ad populum verba facere, nam ſi juſta dixero, Dii me amabunt; ſi injuſta, homines."

DILEN, in *Geography*, a river of Hindooſtan, which riſes beyond, that is, to the north or north-weſt of Ghizni, and receives near Gardaiz another river named Semil; after which the confluent river takes the name of *Cow*, and purſuing its courſe towards Nughz, receives near that place another river, which comes from the quarter of Candahar. See Cow.

DILETTANTE, Ital.; equivalent with *amateur*, Fr. The word is formed, in modern times, from *dilettaré* of *dilectator*, Lat.; one who gives and receives delight from the ſucceſſion and combination of ſounds in muſic.

An Italian dilettante is one delighting in muſic, who has made a conſiderable progreſs in the art, not as a profeſſor, but merely for his own amuſement and that of his friends. See Amateur.

DILICTUM, a term uſed, by Agricola, to expreſs a brine, made by pouring water upon ſand, ſtones, earth, &c. that had been before ſtrongly impregnated with ſea-ſalt; from this brine, a ſalt, for the uſe of the table, was made by evaporation in his time, and is ſtill ſo in many parts of the world. At Junthall, in Germany, they have a ſalt work of this kind, where they make at the rate of eight hundred loaves of ſalt in a week, each loaf weighing four hundred weight.

DILIGENCE, in *Ethics*, a virtue which conſiſts in the active and continued exerciſe of the faculties, and uſe of means for the attainment of any object, whatever that object may be.

Diligence, in *Scots Law*, ſignifies either that attention and care which perſons are bound to exerciſe in the conduct of certain contracts or truſts, and which varies according to the nature of the contract; or, it denotes certain forms of law by which a creditor endeavours to make good his payment, either by affecting the perſon of his debtor, or by ſecuring the ſubjects belonging to him from alienation, or by carrying the property of theſe ſubjects to himſelf.

They are either real or perſonal. Real diligence is that which is proper to heritable or real rights: and perſonal is that by which the perſon of the debtor may be ſecured, or his perſonal eſtate affected. Of the firſt ſort we have two, viz. *inhibition* and *adjudication*, which ſee reſpectively. The latter diligences are *arreſtment* and *poinding*, which ſee.

DILIGENZA, in the *Italian Muſic*, is uſed for a ſoft or ſweet manner of ſinging or playing.

DILIMNITÆ, in *Ancient Geography*, one of the moſt conſiderable of thoſe nations which inhabited Perſia, on this ſide of the Tigris.

DILIN, in *Geography*, a town of Hungary; two miles north of Schemnitz.

DILIS, in *Ancient Geography*, *Lauron*, a port on the coaſt of Gallia Narbonnenſis, eight miles weſt from Incarus, according to the Itinerary of Antonine. M. d'Anville ſays that it is the port of Pontheu, which is eight miles from Carri.

DILL, in *Botany*. See Anethum.

Dill, in *Agriculture*, a name applied to a plant frequently cultivated as a field crop in Glouceſterſhire, and which Mr. Rudge, in his ſurvey of that diſtrict, ſuppoſes to be the *Anethum ſegetum* of Linnæus, and a native of Portugal: but on the Cotſwold hills the ſame term is often given to a large ſort of vetch, which has been there grown for hay for a great length of time.

It is found, according to the writer juſt mentioned, to afford an excellent hay for all ſorts of cattle, but particularly for ewes with ſucking lambs, producing an abundance of highly nutritious milk; and it has the very excellent property of thriving well on ſoils of the poor, thin, and impoveriſhed kind, where other ſorts of artificial graſs-ſeeds would afford but a ſcanty return. In colour the ſeeds incline to red, reſembling thoſe of the vetch in ſhape, but ſmaller.

It is uſual to ſow them broadcaſt in March or the following month, in the proportion of about a buſhel and a half to the acre. They ſoon cover the ground, and require no hoeing or other attention till they are ready for cutting, which, in the moſt favourable ſeaſons, is ſeldom the caſe before the middle or latter end of September, when left for ſeed.

Some cultivators are, however, found to cut it for hay before the bloſſom withers, and then it produces about a ton on the acre: but this is conſidered as the leaſt beneficial mode, as the ſtraw, after the ſeed has been threſhed out, is but little, if at all, inferior to the early mowed. The kid or pod, has the reſemblance of a pea, and ſhould always be fully ripe before it is harveſted, though, when in too great a ſtate of maturity, it is apt to ſhed on being mowed.

The quantity of ſeed which is afforded per acre is frequently ſo much as twenty-four buſhels; the price varying from five ſhillings to eight ſhillings the buſhel.

When ground with barley it has been found to be excellent food for fattening cattle and hogs.

It is, perhaps, a fort of crop that may be grown with advantage on the inferior forts of foil in moft fituations.

Dill, in *Geography*, a town of Germany, in the circle of the Upper Rhine, and feat of a jurifdiction in the county of Spanheim; 26 miles W.N.W. of Creutznach.

DILLA, a mountain and promontory of India, on the coaft of Malabar, fituated in N. lat. 12° 1'. E. long. 75° 2', or 1° weft of Cochin.

DILLENBURG, a fmall town of Germany, in the circle of Weftphalia, on the river Dill; 27 miles N.W. of Marpurg; 54 N. of Francfort on the Mayn; and 60 E. of Bonn. Lat. 50° 45'. It has an ancient caftle, and belonged to the princes of Naffau Dillenburg; but it is now in the confcription of the new kingdom of Weftphalia. See Nassau.

DILLENIA, in *Botany*, a magnificent Eaft Indian genus of plants, named by Linnæus in honour of John James Dillenius, the firft Sherardian Profeffor at Oxford; "becaufe," as he himfelf informs us in his Critica Botanica, p. 80. "it is of all plants the moft diftinguifhed for the beauty of its flower and fruit, like Dillenius among botanifts." Linn. Gen. 277. Schreb. 372. Willd. Sp. Pl. v. 1. 1251. Juff. 281. Clafs and order, *Polyandria Polygynia*. Nat. Ord. *Magnoliæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of five roundifh, concave, large, coriaceous, permanent leaves; at length becoming pulpy, enveloping the capfule. *Cor.* Petals five, roundifh, concave, large, fomewhat coriaceous. *Stam.* Filaments very numerous, linear, crowded, fhorter than the petals, permanent; anthers terminal, erect, oblong, with a recurved point. *Pift.* Germen fuperior, roundifh, depreffed, aggregate, of about 20 cells; ftyles none; ftigmas one to each cell, oblong, depreffed, fpreading in the form of a ftar. *Peric.* Capfules about 20, juicy when ripe, compreffed, ranged circularly round a pulpy receptacle, and covered by the pulpy permanent calyx. *Seeds* feveral in each capfule, inferted along its inner edge, compreffed, fringed at their outer margin.

Eff. Ch. Calyx inferior, of five coriaceous permanent leaves. Petals five. Capfules feveral, compreffed, many-feeded, ranged circularly round a pulpy receptacle.

Linnæus derived his characters of this genus from the defcription and figures in the *Hortus Malabaricus*, v. 3. t. 38, 39, with the infpection of a dried fpecimen only. Hence he has not well characterized the feeds as "imbedded in pulp *under* the capfules." The fruit was firft explained more correctly in Dr. Smith's Exotic Botany, v. 1, where, however, in the full defcription, the capfule is faid to confift "of 20 cells," whereas it is rather, as in the generic character, an affemblage of 20 capfules, coalefcing when ripe into one pulpy mafs. Curtis and Willdenow have confounded with this genus the *Hibbertia* of Andrews, *Repof.* v. 3. t. 126, which the former, by a moft ftrange and unaccountable mifapprehenfion, took for the original D. *indica*. The three following are the moft certain fpecies of *Dillenia*.

1. D. *fpeciofa*. Thunb. Tr. of Linn. Soc. v. 1. 200. Sm. Exot. Bot. v. 1. 3. t. 2, 3. (D. indica; Linn. Sp. Pl. 745. Syalita; Rheed. Malab. v. 3. 39. t. 38, 39.) "Leaves elliptic-oblong, fimply ferrated. Flowers folitary. Stigmas lanceolate." A native of the forefts of Malabar and Java, where it forms a tree 40 or 50 feet high, with a very thick ftem, and a rugged bark, which, when wounded, difcharges an aftringent watery fluid. The leaves are a foot, more or lefs, in length, crowded about the ends of the branches, on winged footftalks, oblong inclining to elliptical, fharply but fimply ferrated, furnifhed with one rib and numerous parallel tranfverfe veins, roughifh but not hairy, except on the back of the veins. Flowers terminal, folitary, four or five inches in diameter, fragrant and very handfome, on fimple round ftalks. Their petals are white, with ribbed yellowifh claws. Stamens of a bright full yellow, forming a globofe denfely imbricated mafs, crowned with the ftigmas in the form of a white ftar. The fruit is as big as a man's fift, refembling a large greenifh apple, but lobed, owing to the five leaves of the calyx, enlarged and become juicy, which compofe its outfide, enveloping the capfules and their central receptacle, all likewife very fucculent, and conftituting an eatable, though very acid, fruit, which, as Rheede informs us, requires fugar, broth, or fome other addition, to make it palatable. A living plant of this fpecies was fent by Dr. Roxburgh to lady Amelia Hume, and is in a thriving condition, being the firft and only *Dillenia* ever yet feen in the gardens of Europe, except fome young plants raifed by Mr. Clifford, in Holland, which fcarcely furvived three weeks. In a wild ftate the tree begins to bear when about four years old, ripening its fruit in December and January.

2. D. *aurea*. Sm. Exot. Bot. v. 2. 65. t. 92, 93. (D. ferrata; Thunb. Tranf. of Linn. Soc. v. 1. 201? Sangius; Rumph. Amboin. v. 2. 142. t. 46?) "Leaves elliptic-oblong, doubly ferrated. Flowers moftly folitary. Stigmas linear." This was gathered by lieutenant-colonel Hardwicke, F.L.S., in thickets to the eaft of the river Gogra, and other parts of the Eaft Indies, flowering in April, and ripening fruit in May. The flowers are but half the fize of the former, yellow, ftanding either folitary or in pairs, on round ftalks, at the fummits of the fmaller branches, and come out before the leaves appear. The latter are deciduous, ftalked, about fix inches long, acute, doubly ferrated, ribbed, and veined like the laft, their form inclining to obovate. Fruit the fize of a walnut, of a rich orange-colour throughout, and very juicy. This agrees much with the *Sangius* of Rumphius, which Thunberg adopted from him by the name of *Dillenia ferrata*, but the leaves in our's are doubly ferrated, and the flower-ftalks fcarcely ternate.

3. D. *pentagyna*. Roxb. Coromand. v. 1. 21. t. 20. Leaves elliptic-oblong, fimply ferrated. Flower-ftalks lateral, many together. Stigmas five. Found by Dr. Roxburgh in the vallies far up among the mountains of Coromandel, flowering in March and April. The leaves are as large as thofe of the firft fpecies; the flowers fmall, yellow, on fimple ftalks, growing many together in bundles along the branches. The fruit is pendulous, the fize of a goofeberry.

Lefs certain fpecies are, 4. D. *elliptica*. Thunb. in Tr. of Linn. Soc. v. 1. 200, taken up by that author, without feeing it, from the *Songium* of Rumphius, v. 2. t. 45, which Thunberg conceives to be different from D. *fpeciofa*, to which Linnæus referred it. 5. D. *integra*. Thunb. ib. 199. t. 18. "Leaves obovate, obtufe, nearly entire." Found in Ceylon. 6. D. *retufa*. Ibid. 200. t. 19. "Leaves obovate, truncate, ferrated." From the fame country. 7. D. *dentata*. Ibid. 201. t. 20. "Leaves obovate, abrupt, toothed. Flowers feveral on a ftalk." Found alfo in Ceylon. Thefe four belong to a genus eftablifhed by Rottböll in the New Copenhagen Tranfactions, under the name of *Wormia*. We are not fufficiently acquainted with its piftils or fruit to fay how far it is in thofe parts diftinct from the real *Dilleniæ*, which laft were, in that refpect, equally unknown to Rottböll. In the 7th fpecies Thunberg defcribes three flowers on a ftalk; our fpecimen has fix, forming a fimple *racemus*.

DILLENIUS, John James, in *Biography*, one of the moft celebrated botanifts of the 18th century, efpecially for his knowledge of Moffes and their allies, was born at Darmftadt, in Germany, in 1687. He was educated for a phy-

fician

fician in the Univerfity of Gieffen, and is fuppofed to have taken there his degree of doctor of phyfic. At leaft, he ufed that title before it was conferred on him at Oxford in 1735. During his ftay at Gieffen he publifhed feveral papers in the *Ephemerides* of the Imperial Academy *Naturæ Curioforum*, of which he was an active member. The fubjects of thefe effays were, 1ft, an examination of fuch American plants as have been naturalized in Europe; 2d, on the Coffee of the Arabians, with a recommendation of rye as the beft fubftitute for it; 3d, a botanical examination of the *Spergula pentandra*, and fome plants allied to it; 4th, an account of fome Cryptogamous plants, as they have fince been denominated; 5th, on obtaining opium from poppies grown in Germany; and, 6th, a zoological paper on leeches, and two fpecies of *Papilio*.

In 1719, he publifhed his *Catalogus Plantarum fponte circa Giffam nafcentium*, arranged according to their times of flowering, a method certainly as little fcientific, and as puzzling as could well be contrived. Accordingly, nothing can be found in fuch a book but by the index, a method recommended by a recent writer for finding out plants in certain natural fyftems; and we believe it to be the moft infallible. This work of Dillenius, however, contains accurate defcriptions of many plants before not well determined, with figures, drawn and engraved by himfelf, of the parts of fructification, he having always been laudably anxious to eftablifh the genera of plants on folid foundations. A criticifm of the methods of Tournefort, Knaut, and Rivinus, is prefixed to this Flora, by which he gave offence to the latter, and was anfwered by him with fome degree of afperity. This drew an acrimonious and rather unfair reply from Dillenius, fubjoined to fome copies of the work in queftion. The reader who troubles himfelf to inveftigate thefe and fimilar difputes, in which the art of man contends with the intricacies of nature, while paffion and prejudice bewilder both the writer and the reader, will think with fir Roger de Coverley that "much may be faid on both fides," and perhaps that it might be faid a great deal better. Dillenius himfelf fhewed his wifdom and fuperiority fome time after, when attacked by Threlkeld, an Irifh writer, by treating his remarks with that filent contempt which coarfe mifreprefentation and envious malignity always feel their fevereft punifhment.

The work above-mentioned procured Dillenius the correfpondence and friendfhip of the excellent and learned William Sherard, who returned in 1718 from Smyrna, where he had been Britifh conful, and who, after making a tour on the continent, vifited our author in Germany, and in Auguft 1721 brought him to England. Here in 1724 Dillenius publifhed his valuable and popular edition of Ray's *Synopfis*, illuftrated with 24 plates of his own, and with abundance of remarks, additional plants, efpecially of the cryptogamous kind, and additional places of growth for many of the rare fpecies. It has been already obferved, Tranfactions of the Linn. Soc. v. 4, 277, that "he has, with commendable modefty and diffidence, diftinguifhed from the original work all his own additions, being well aware of the danger of miftakes. It cannot be concealed that he has added feveral plants upon infufficient grounds, either as fpecies or natives, and has inferted others, fuppofed to be new, that exift under other denominations in the original work. The changes he has made among the fynonyms, not being always marked, and proving often erroneous, oblige us on that head ftill to confult the edition of 1696." On the other hand, Dillenius made fome ufeful corrections. He diftinguifhed and figured the *Hieracium*, afterwards called *alpinum* by Linnæus, which Ray had miftaken for *H. villofum quintum* of Clufius, *villofum* of Linnæus; a very different fpecies, fince obferved in Scotland. He added much to the graffes, but rather varieties than fpecies, which may alfo be faid of the mints; but in moffes, lichens, marine plants, and fungi, he greatly enriched this edition. This book was the chief guide of thofe who ftudied Britifh plants, till Mr. Hudfon's *Flora* appeared in 1762, and its felling price has confiderably encreafed even fince that time.

From Dillenius's firft arrival in England, he had refided in London, frequently vifiting Eltham in Kent, where Dr. James Sherard, brother of the above William, had a houfe and garden. Hence originated his moft fplendid work, the *Hortus Elthamenfis*, publifhed in 1732, in two volumes folio, with 324 plates, drawn and engraved by his own hand, as were thofe of his other publications. In thefe plates, 417 fpecies of plants are delineated with great fidelity. The plates, though not beautiful as engravings, have an air of truth, and a degree of luminous precifion, which none but a botanift can give. They contain almoft a complete illuftration of the genus *Mefembryanthemum*, as far as it was then known. Several new genera are here firft eftablifhed, and many obfcure or rare fpecies elucidated. The letter prefs abounds in ample defcriptions, elaborate criticifms, and intelligent remarks, delivered in good language. Some copies were coloured by the author, and are probably very correct, though, as works of art, inferior to what we are accuftomed to fee at prefent.

Before the publication of the *Hortus Elthamenfis*, its author was fettled in the new botanical profefforfhip at Oxford, founded by his learned and munificent patron William Sherard, who died in Auguft 1728. The aim of this gentleman was the continuation of Bauhin's *Pinax*, upon which he had beftowed great labour and attention, and he left by will 3000*l*. to endow the profefforfhip in queftion for the purpofe of purfuing his fcheme, having previoufly built, adjoining to the Oxford garden, a mufeum, to which he bequeathed his library, herbarium, and manufcripts. He ftipulated that Dillenius fhould be the firft profeffor, and limited the appointment in future to Doctors of Phyfic, graduates of Oxford, not in holy orders, from among whom the profeffor is chofen by the London College of Phyficians. Dillenius fpent the remainder of his life in the ftudy of botany, but the *Pinax* never appeared. Botanical publications multiplied fo faft, and required fuch ample pecuniary refources to obtain them all, that they were quite out of his reach. This is perhaps the lefs to be regretted, as he was not fupremely accurate in fynonymy. Indeed the end in view is become rather obfolete fince the prevalence of the Linnæan fyftem of arrangement and nomenclature. All botanical works now fpeak one language, and for the moft part wear one form and afpect, fo that a general index to them is, in a great meafure, fuperfluous. It is, indeed, much to be lamented that the Sherardian and Dillenian *Pinax*, as far as it went, has not been publifhed, as it probably would prove nearly a complete index to all the botanical knowledge previous to the eftablifhment of the prefent clear and fimple plan of nomenclature. Linnæus vifited Dillenius at Oxford in 1736, and though the latter was previoufly rather unfavourably difpofed towards his reformations and innovations, as tending to create difficulty and confufion in the firft inftance, he foon forgot all fuch prejudices, and thefe two great men became mutually attached, as honeft liberal cultivators of fo liberal and pleafing a fcience ought to be. Dillenius wifhed to fix Linnæus at Oxford, as his coadjutor in the *Pinax*, and if fir Hans Sloane had been equally difcerning and equally liberal, the illuftrious Swede might have been naturalized amongft us. Here, however, it is worthy of remark, as we have alluded above to the mifchiefs of literary rivalfhip and enmity, that partiality among philofophers may fometimes be no lefs mifchievous.

mifchievous. The errors of Dillenius refpecting the fructification of moffes, of which we fhall fpeak hereafter, were too implicitly adopted by Linnæus, againft his own judgment and obfervation; and hence a totally erroneous ufe of terms has prevailed in his works, and thofe of his followers, to the prefent day. In his *Flora Lapponica* he often cites Dillenius, efpecially concerning willows, for information refpecting fynonyms, that is erroneous; but his own remarks being fubjoined, we are guarded againft any errors that might enfue from fuch high authority. The *Critica Botanica* of Linnæus was dedicated to the Sherardian Profeffor, as being, from his peculiar occupation and duty, more than any other perfon aware of the evils arifing from confufion in botanical nomenclature, and the praife and refpect, habitual in dedications, have rarely been fo fincerely beftowed, or fo juftly deferved. Linnæus remarked, in a letter to Haller, May 1, 1737, that "Dillenius was the only perfon then in England who either cared about, or underftood the genera of plants;" a degree of fcientific commendation which, in any age or country, can be extended to very few perfons. Nor did he to whom it was then applied, long continue in the fame degree to deferve it. We learn from the correfpondence of Dillenius with Haller, that his whole attention was now abforbed by the family of Moffes, under which were included not only the natural order of plants, properly fo called, but the tribes at prefent denominated *Hepaticæ*, and *Lichenes*, as well as *Byffi*, *Confervæ*, *Ulvæ*, *Tremellæ*, and others. *Fuci* and *Fungi* were, indeed, the only Cryptogamic families not illuftrated in the great work upon which the chief reputation of Dillenius now fecurely refts, and which appeared in 1741, in one volume quarto, under the title of *Hiftoria Mufcorum*. It confifts of 576 pages, with 85 plates, each containing numerous figures, drawn and engraved by the author. The propofals promifed but 464 pages, and 80 plates. The index is one of the moft ample and complete that any book can boaft. Of this work 250 copies only were printed; and though the fubfcription price was no more than one guinea for thofe printed on ordinary royal paper, and a guinea and half for fine Dutch royal, the book fold very heavily. Eight copies went to Holland. It found its way alfo into fome fine Englifh libraries, and we have known it ftand, fairly lettered and untouched, on the fhelves of collectors, as a *hiftory of the mufcovites*. Some botanifts, however, acquired and ufed it. Linnæus trufted implicitly to it, and thence adopted fpecies into his works, as his own fubfcription copy, on fine paper, evinces. From its being frequently quoted, and the fubject more ftudied of late, the price of the *Hiftoria Mufcorum* is now increafed more than ten-fold. The plates, with an index or fynopfis only, were reprinted by Millan in 1763; and even this edition is now advanced in price. The plan of the original one is as complete as poffible, both with refpect to the botanical characters and defcriptions, the fynonyms and hiftory, as well as the ufes and qualities of the plants of which it treats. The fpecific characters, both in Latin and Englifh, which were intended to ferve as names, are more fcientific than thofe of moft works of that day, and the varieties under each are carefully inveftigated. The plates reprefent every fpecies, often of various ages, and under different forms and appearances, frequently with feparate leaves, or other parts. Nothing can be more expreffive or characteriftic than thefe figures, except, perhaps, with regard to the cruftaceous and imbricated Lichens, which are lefs happily reprefented than the reft. What is chiefly to be regretted, refpecting the moffes, is the want of a higher magnifying power, whence the ftructure of the fringe of the capfule, and innumerable nice marks of difcrimination in the leaves, or other organs, now familiar to the moft fuperficial ftudent, paffed unnoticed by Dillenius. On this head, the *Stirpes Cryptogamicæ* of Hedwig have made botanifts faftidious; and if that work had been as wide in extent, as excellent in execution, the performance of Dillenius would foon have become obfolete, however fuperior, as beyond all comparifon it is, in botanical learning, and correctnefs of ftyle. One thing we cannot help regretting, the illiberality with which Dillenius too often fpeaks of his fellow-labourer in this tribe Micheli, who publifhed 13 years before him, and had been dead about four years when the work of Dillenius appeared. We are difgufted with infinuations, that Micheli delineated or defcribed more than was to be feen in nature; a practice of which that faithful and amiable writer was as incapable, as of the illiberality of gratuitoufly charging another with it. Happily, every one of his obfervations, as far as we can recollect, has been verified by fubfequent botanifts, efpecially the feeds of Lichens, *t.* 52, &c. Thefe eminent men fell into one common error, concerning the parts of fructification of moffes, taking for the anther what is now proved to be the capfule, in which miftake Dillenius was, as we have already hinted, implicitly followed by Linnæus, and, indeed, by Haller and others, till the Hedwigian fchool arofe. Yet Dillenius has efcaped much of the difgrace by ufing the word *capfula* for what he believed to be an *anthera*, and Linnæus, from correcting this error, as he thought, has been fuppofed the author of the above falfe theory. The part in queftion is properly called a capfule, but Dillenius mifapplied that term, as he believed it an anther, of which few of his readers are aware. Dr. Pulteney has obferved, that the *Hiftoria Mufcorum* was the firft book printed in England in which any of the Linnæan fpecific characters were exhibited. The learned Swede communicated feveral things to this work, and ftill continued to correfpond with its author, whofe laft letter to him is dated Feb. 10, 1746. In this he afks for moffes, and accounts for his not being able to furnifh certain exotic feeds which Linnæus had required of him. In an earlier letter he complains of the low and watery fituation of his Oxford garden, where the heavy morning dews and fogs, in autumn, were extremely unfavourable to the ripening of feeds. There appear, in his letters, fcarcely any traces of the coolnefs or rifing difpleafure between thefe old friends, which the letters of Dillenius to Haller fhew to have exifted, on his part at leaft. In a letter to Linnæus, fo early as April 30, 1741, he complains of growing old, and not enjoying good health. He is faid to have been of a fhort ftature and corpulent habit, and it is probable he led a fedentary life. He died of an apoplexy, April 2, 1747, in the 60th year of his age. His place of interment is not recorded, nor does it appear that any monument has been erected to his memory. A portrait of him exifts in the picture-gallery at Oxford, of which a print has been publifhed in the *Annals of Botany*, by Dr. Sims and Mr. Konig. The countenance is expreffive of an eafy placid difpofition, and fuch is faid to have been the character of Dillenius. The imperfections of temper, to fome indications of which we have alluded above, feem not to have been habitual nor permanent. He lived on eafy terms with thofe around him, and was refpected as a man of probity. He was never married, nor have we found mention of any of his relations, except one whom he very effentially aided in pecuniary difficulties, to his own great lofs. His drawings, among which are very numerous and valuable reprefentations of Englifh *Fungi*, his books, manufcripts, and efpecially his collection of dried fpecimens referring to his *Hiftoria Mufcorum*, were bought of his executor, by his fucceffor in the Profefforfhip, the late Dr. Humphrey Sibthorp, and are

now

now in the Sherardian library at Oxford. They have been frequently ſtudied by ſucceeding botaniſts, as may be found recorded in the works of Lightfoot, Dickſon, Turner, and the writer of this article: the preſent amiable Profeſſor, Dr. George Williams, being happy at all times to render them uſeful, and to forward the views of the truly excellent founder. Kippis in Biogr. Brit. Letters of Dillenius to Haller and Linnæus. Dill. Plantæ circa Giſſam. Hort. Elth. and Hiſt. Muſc. Haller Bibl. Bot.

DILLEUGHING. See Tin.

DILLINGEN, in *Geography*, a ſmall town of Germany, in the circle of Swabia, biſhopric of Augſburg, with an univerſity founded by biſhop Otto in 1552, and ſeveral monaſteries and convents of Nuns. It is ſituated on the Danube; 24 miles N.E. of Burgau, 12 N.W. of Augſburg, and as many of Donawerth. Lat. 48° 30′.

DILLON, Wentworth, earl of Roſcommon, in *Biography*, a nobleman diſtinguiſhed for his poetical talents, was born in Ireland about the year 1633. His mother was ſiſter of the great earl of Strafford, and at the ſeat of this nobleman, in Yorkſhire, he was inſtructed in the rudiments of a learned education. Thence he was removed to the univerſity of Caen in Normandy, where he ſtudied under the learned Bochart. He next ſpent ſome time in foreign travel, and became an accompliſhed man, as well as a profound ſcholar. His return to England was ſoon after the reſtoration, when he was made captain of the band of penſioners. At the diſſolute court of Charles II., he became diſſolute, and addicted himſelf to the faſhionable vices and manners of thoſe with whom he lived, and among whom, from his office, he was obliged to aſſociate. At the gaming-table he loſt much of his property, and in diſputes, the conſequences of play, he frequently hazarded his life. On account of a quarrel with the lord privy ſeal, about part of his eſtate, he found it neceſſary to reſign his poſt, and return to Ireland, where he was appointed captain of the guards. His paſſion for gaming ſtill continued, which involved him in ſimilar difficulties to thoſe he had experienced in England. Once, as he returned to his lodgings from a gaming-table, he was attacked in the dark by three ruffians, who had been employed to aſſaſſinate him. The earl, ever courageous, defended himſelf with ſo much reſolution, that he diſpatched one of the aggreſſors, diſarmed another, and obliged the third to ſecure his ſafety by flight. After a few years reſidence in Ireland, he returned to London, and was made, almoſt immediately, maſter of the horſe to the ducheſs of York, and married, about the ſame time, the daughter of the earl of Burlington. Notwithſtanding his diſſolute habits, he was the friend, and, in ſome meaſure, the patron of literature. He now formed the plan of a ſociety for refining the Engliſh language, and fixing its ſtandard: in this he was aided by Mr. Dryden; but lord Roſcommon did not live to bring it to maturity. He never took any lead in politics, but was inclined to high monarchical principles. When James II. aſcended the throne of theſe realms, he formed the reſolution of taking up his reſidence in Rome, but a ſudden fit of the gout, which prevented him from ſetting out on his journey, together with the unſkilfulneſs of his medical attendants, proved fatal. He died in the year 1684, and was buried in Weſtminſter abbey. This nobleman was author of ſeveral poetical pieces, which poſſeſs conſiderable merit. Of theſe the chief is, "An Eſſay on Tranſlated Verſe," a didactic piece, explaining the rules by which tranſlations ſhould be made. He publiſhed, likewiſe, in blank verſe, a tranſlation of Horace's Art of Poetry; a paraphraſe on the 148th pſalm; a tranſlation of the ſixth eclogue of Virgil, of ſome of the odes of Horace, and many ſmaller pieces. In ſpeaking of the powers of this nobleman, Dr. Johnſon ſays, "He is elegant, but not great; he never labours after exquiſite beauties; but ſeldom falls into groſs faults. His verſification is ſmooth, but rarely vigorous, and his rhymes are remarkably exact. He improved taſte, if he did not enlarge knowledge, and he may be numbered among the benefactors to Engliſh literature." Biog. Brit.

DILLSBERG, in *Geography*, a town of Germany, in the circle of the Lower Rhine, and palatinate of the Rhine; 6 miles E. of Heidelberg.

DILLWYNIA, in *Botany*, ſo named by Dr. Smith in honour of Mr. Lewis Weſton Dillwyn, F.R.S., F.L.S., author of an eminently valuable work on Britiſh *Confervæ*. Sm. in Sims' and Konig's Annals of Botany, v. 1. 510. Claſs and order, *Decandria Monogynia*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, ſect. 4. Juſſ.

Gen. Ch. *Cal.* Perianth bell-ſhaped, two-lipped, without appendages; angular at the baſe: upper lip of 2 oblique, divaricated ſegments: lower of 3 direct, nearly equal ones. *Cor.* papilionaceous, of 5 petals; ſtandard broad, almoſt kidney-ſhaped, with a linear claw of its own length; wings obovate, ſhorter than the ſtandard, each with an incurved tooth on its upper edge near the baſe; keel ſhorter than the wings, of 2 petals, each with a tooth at the upper edge. *Stam.* Filaments 10, ſeparate, awl-ſhaped, aſcending, the lowermoſt gradually longer, all encloſed in the keel; anthers roundiſh, 2-lobed. *Piſt.* Germen ſuperior, oblong; ſtyle ſhort and thick, bent upwards; ſtigma obtuſe, downy. *Peric.* Legume ovate, inflated, of one cell. *Seeds* 2, kidney-ſhaped, ſmooth, each with a white gland-like appendage.

Eſſ. Ch. Calyx five-cleft, two-lipped. Corolla papilionaceous. Style recurved, ſhorter than the germen. Stigma obtuſe, downy. Legume inflated, of one cell, with two ſeeds.

Sp. 1. D. *ericifolia*. Sm. Exot. Bot. v. 1. 47. t. 25. "Leaves linear, twiſted, rough with minute points. Flowers nearly terminal." Stem ſhrubby, 4 or 5 feet high, much branched, ſpreading; the branches cluſtered, ſlender, rigid, leafy, clothed when young with ſhort, denſe, prominent pubeſcence. *Leaves* ſcattered, numerous, ſpreading, on ſhort ſtalks, linear, narrow, acute, entire, revolute, rough, with ſmall points, twiſted ſo that their convex under ſide is turned uppermoſt; the other ſide is marked with a longitudinal furrow. *Stipulas* minute, gland-like, one on each ſide of the footſtalk at its baſe. *Flower-ſtalks* cluſtered about the ſummits of the branches, rarely lateral. *Bracteas* numerous, concave, at the baſe of the flower-ſtalks, with a pair towards their middle. *Flowers* elegant, but inodorous. *Calyx* fringed at the edge with white denſe woollineſs, otherwiſe ſmooth, and often reddiſh. *Petals* of a golden hue, not changed by drying; the ſtandard marked with a crimſon radiating central ſpot. *Legume* ſomewhat hairy, crowned by the thick baſe of the ſtyle.—This was one of the firſt plants whoſe ſeeds or dried ſpecimens were brought to England from New South Wales, and it flowered in the London nurſeries about the year 1793. It is eaſily propagated by ſeed, and only requires in winter the ſhelter of a greenhouſe, with regular but moderate ſupplies of water, and a turfy ſoil with ſome loam. 2. D. *floribunda*. Sm. Exot. Bot. t. 26. "Leaves linear, ſomewhat twiſted, rough with tubercles. Flowers lateral, axillary." A rather larger ſhrub than the laſt, brought from the ſame country. *Leaves* leſs ſpreading and more crowded, as well as broader, and covered with coarſe callous tubercles. *Stipulas*, as far as we have diſcovered, wanting. *Flowers* copious, lateral, axillary, ſolitary, on ſhort bracteated ſtalks, their ſtandard ſcarcely ſo broad

broad in proportion to its length, but otherwife much like the former. *Legume* very hairy, crowned with the fmooth ftyle. 3. D. *glaberrima*. Sm. in Ann. of Bot. v. 1. 510. Labillard. Nov. Holl. v. 1. 109. t. 139. "Leaves linear, ftraight, triangularly keeled, fmooth. Flowers terminal, crowded." This is fmaller and more flender than either of the foregoing, with perfectly fmooth *leaves*. *Stipulas* awl-fhaped, minute. *Flowers*, as far as we can learn from the dried fpecimens, moft like the firft fpecies. This plant, though found about Port Jackfon, New South Wales, has never yet been cultivated in England. 4. D. *myrtifolia*. Sm. in Tr. of Linn. Soc. v. 9. (D. obovata; Labillard. Nov. Holl. v. 1. 110. t. 140?) "Leaves decuffated, obovate, flightly concave, obfcurely five-ribbed, fmooth. Flowers axillary." Communicated to the author by Mr. Menzies, who gathered it at King George's Sound on the weft coaft of New Holland. It has not been feen alive in Europe. It feems a very bufhy fhrub. The *branches* are fmooth and angular. *Leaves* crowded, oppofite, croffing each other in pairs, obovate, ftalked, entire, fmooth, tipped with a pungent point, and marked with 5 ribs, 2 of which are lefs confpicuous than the reft. The upper fide is much the paleft; the under purplifh. *Stipulas* minute, ovate, fringed. *Flowers* feemingly like thofe of the fecond fpecies. If this be the *obovata* of M. Labillardiere, which feems probable, our name muft give way to the right of priority. 5. D. *glycinifolia*. Sm. in Tr. of Linn. Soc. v. 9. "Leaves ovate or linear, revolute, reticulated. Flowers racemofe." This alfo is known to us merely by fpecimens gathered at King George's Sound by Mr. Menzies. Its habit is very unlike the reft, and more refembles fome of thofe fimple-leaved plants now referred to *Glycine*; fee Curt. Mag. v. 8. t. 263. The *ftyle* is "fo recurved as almoft to form a circle, not ftraight at the bafe and then fuddenly hooked, as in the genuine *Dillwyniæ*." The *legume*, moreover, is unknown, and when difcovered, may ftamp the plant as a new genus. The *calyx* and *corolla* fufficiently accord with that to which it is here referred. S.

DILUENTS, in *Medicine*, are thofe liquors which increafe the fluidity of the humours in the animal body.

It is well known that the ordinary fluidity of the blood is owing to water, which, in great proportion, is conftantly prefent in it; and that the chief, and, perhaps, only means of increafing its fluidity, will be by increafing the proportion of water in it. The fame may be faid, indeed, of the fecreted and excreted fluids in general, fo that water may be confidered as the only proper general diluent.

Nature having appointed water to be univerfally the drink of the whole animal creation, it is, therefore, in man, the proper object of thirft; and its firft operation is to quench this appetite, and thereby remove a very uneafy fenfation, which is often, in febrile difeafes particularly, a confiderable irritation of the whole fyftem. It does this not only by its coolnefs and fimple fluidity, but alfo by its diluent power, in diffolving the vifcid matter of the mouth and internal fauces.

As the greater part of mankind take drink along with their folid food, there can be little doubt that a certain portion of diluent drink, and particularly of water, taken into the ftomach, favours the folution and digeftion of the folid aliment, and alfo contributes to the more fpeedy evacuation of the ftomach. The quantity neceffary for this is very different in different perfons, and muft be fuited to the feelings of every individual; but with this obfervation, that a larger proportion than neceffary, by increafing the diftenfion of the ftomach, contributes to take off what appetite might otherwife remain; and it is commonly proper, only, after the digeftion is over, to throw in a quantity of water to finifh that bufinefs more completely, and to promote the entire evacuation of the ftomach. But this diluent is not only neceffary for the affiftance of digeftion, but otherwife, alfo, to the ftate of the ftomach itfelf. As the mucous glands of this organ throw out a large quantity of a heavy vifcid fluid, which, remaining in the ftomach, gives an uneafy fenfe of weight, and impairs the appetite; fo in this morbid ftate, a quantity of water, by diluting and favouring the abforption and evacuation of this mucus, may often be the moft certain remedy.

When water is carried into the inteftines, it will, by mixing with the bile, diminifh the acrimony of this fluid, and obviate irritations that might otherwife have thence arifen. By diluting the contents of the inteftines, it will certainly promote the more entire folution of thefe, and even, by its bulk, favour their progrefs: and the dilution may likewife favour the abforption of the finer and nutritious parts by the lacteals. A large quantity of water, quickly taken, and paffing into the inteftines, may, by its bulk, increafe their action, and thus prove laxative: in this way water has been known, in numerous inftances, to prove a very ufeful remedy, by clearing out the whole of the contents, whether natural or morbid, which might be ftagnant there. The common people, who commonly take every thing that has the name of a mineral water, in very large quantities, often thus obtain much benefit from waters of no fenfible impregnation.

When any unufual quantity of water enters the lacteals or other abforbents, it muft contribute to increafe the fluidity of their contents, and to expedite their motions, and perhaps to keep up the free paffage through the conglobate glands, which are liable to obftructions. When water enters the blood-veffels by the thoracic duct, it muft, in proportion, increafe the fluidity of the whole mafs of blood, and is certainly the means by which its fluidity is ordinarily preferved. But, in healthy bodies, or fuch as are without any obftruction of the excretions, any unufual diftenfion of the veffels cannot in this way be produced, or long fubfift; for it is not to be doubted that fuch increafed quantity of water in the blood, will immediately pafs off by one or other of the excretions: and this effect of diluents is important in the treatment of difeafes.

From this detail of the effects of water, when taken freely into the body, it will readily appear that the abundant ufe of it, with very few exceptions, may be confidered as a very general means of preferving the health, and that it is an important agent in the cure of many difeafes.

In the firft place, by removing the difagreeable fenfation of thirft, which is common in febrile difeafes, dilution removes one of the irritations which tend to keep up the febrile ftate. And, fecondly, by the difpofition of diluents to pafs off by the excretions, they tend to diminifh fevers by exciting a regular perfpiration. In many difordered ftates of the ftomach and other organs of digeftion, which attack the fedentary and indolent, and thofe of irregular habits of life, and are included under the term *bilious*, diluents, by aiding digeftion, and the evacuation of the ftomach and duodenum, are of great utility, and much of the effect of all mineral waters, on the hypochondriac and other invalids, who frequent watering places, is to be attributed to the fimple dilution. By thefe means, and by its paffage through the abforbent, and glandular fyftems, water freely taken is fignally beneficial in the cure of fcrofulous obftructions; and the pureft waters, with the leaft fenfible impregnation, have been particularly extolled for their virtues againft this difeafe. Thus Ilkley fpa has been celebrated

celebrated by Dr. Moffman; and at Rheims, the water, which was extremely pure, was fo renowned for the cure of fcrofula, that an hofpital, for the reception of patients labouring under that malady, was erected there.

Diluents, in confequence of their difpofition to pafs off by urine, efpecially when perfpiration is not encouraged, are ufeful in allaying the pain of ftrangury and ardor urinæ, by diluting the acrimonious falts of the urine, and thus diminifhing the irritation which they would excite in paffing the neck of the bladder and the urethra, when rendered acutely fenfible by inflammation. It is, doubtlefs, to the quantity of diluents taken in, with demulcent medicines, rather than to any fpecific effects of the latter, that this fuccefsful operation is to be attributed. See Demulcent.

All aqueous liquors, that is, all liquors confifting chiefly of water, without the addition of other matters, that may either diminifh the diluent qualities of it, or give it peculiar properties, are to be confidered as diluents operating in the way above defcribed, and poffeffing the properties of fimple water. See Cullen, Materia Medica, vol. ii.

DILURO, in *Ancient Geography*, a river of Spain, according to Ptolemy, called by Pliny Iluro, and by Mela Eluro.

DIMA, or Dyma, in *Ancient Geography*, a town of Thrace.

DIMACHÆ, from δις, *double*, and μαχω, *I fight*, in *Antiquity*, a kind of horfemen, firft inftituted by Alexander. Their armour was lighter than that of the infantry, and at the fame time heavier than that ufed by horfemen, fo that they could act as horfe or foot as occafion required.

DIMACHÆRUS, Διμαχαιρος, from δις, and μαχαιρα, *fword*, a gladiator who fought with two fwords.

DIMALUM, in *Ancient Geography*, a town of Illyria, according to Polybius, called Dimallum by Livy.

DIMBACH, in *Geography*, a town of Germany, in the archduchy of Auftria; 4 miles N. of Grein.

DIMCHURCH, or Dinchurch, a village of England, in the county of Kent, fituated by the fide of a ftrong dyke, called "Dimchurch wall," between Romney and Hythe, to prevent the encroachments of the fea, with a carriage road on the fummit, wide enough in general for carriages to pafs each other; $4\frac{1}{2}$ miles N.N.E. of New Romney, and $4\frac{1}{2}$ S.S.W. of Hythe.

DIMENSION, the extenfion of a body, confidered as meafurable.

Hence, as we conceive a body extended, and meafurable in length, breadth, and depth, we conceive a trine dimenfion, *viz.* length, breadth, and thicknefs. The firft called a line, the fecond a furface, the third a folid.

Dimension is particularly ufed with regard to the powers of the roots, or values of the unknown quantities of equations, which are called the dimenfions of thofe roots. See Equation and Root.

Thus in a fimple equation, the unknown quantity is only of one dimenfion, as $x = a + b$. In a quadratic equation it is of two dimenfions, as $x^2 = a^2 + b^2$. In a cubic, of three, as $x^3 = a^3 - b^3$, &c.

DIMETER. See Iambic.

DIMETIENT, in *Geometry*, is fometimes ufed for diameter.

DIMIKUR, in *Geography*, a town of Bohemia, in the circle of Koniggingratz; 10 miles W. of Biezow.

DIMINISHED Interval, in *Mufic*. See Interval.

Diminished *fecond* is a femitone major, leffened by a femitone minor. See Interval and Second.

Diminished *third*, by fome called defective third, is properly a third minor leffened by a femitone minor. But among practical muficians it commonly fignifies an interval equal to two femitones major. And this they confound with the former; but there is a difference between them, equal to the difference between a tone-major and minor, that is, a comma. The firft mentioned of thefe diminifhed thirds will be expreffed by $\frac{144}{125} = \frac{4}{5} : \frac{25}{24}$, and is equal to the tone-major and enharmonic diefis; for $\frac{144}{125} = \frac{9}{8} \times \frac{128}{125}$. The fecond diminifhed third will be expreffed by $\frac{256}{225} = \frac{16}{15} \times \frac{16}{15}$, which is a comma lefs than the former. See the table in the article Interval.

Diminished *fourth*. See the table in the article Interval.

The diminifhed fourth often occurs in practice, as from C to G ♮ defcending; and fometimes, though more rarely, from G ♮ to C afcending.

Diminished *fifth*, is lefs than the true fifth by a femitone minor, and is therefore equal to two leffer thirds.

Practitioners often confound the diminifhed fifth with the femi-diapente, or falfe fifth, which is a comma lefs. See Interval.

Diminished *fixth*. This interval, according to Ozanam, contains two tones and three femitones major; or a fourth and diminifhed third; or a diminifhed fourth and third minor. Thus from C ♮ to A ♭ is a diminifhed fixth.

But as there are two diminifhed thirds, fo there may be as many diminifhed fixths; thefe being the complements of the former to the octave. One of thefe diminifhed fixths will be expreffed by $\frac{1021}{675} = \frac{4}{3} \times \frac{256}{225}$, and this is a femitone major more than the femi-diapente; the other diminifhed fixth will be $\frac{676}{375} = \frac{4}{3} \times \frac{144}{122}$, which is a femitone minor lefs than the flat fixth. Practitioners confound thefe two; and, in effect, in temperate fcales they coincide, as do all other intervals differing only by a comma. See Temperament.

Diminished *feventh* is of two kinds, differing by a comma. See the table in the article Interval.

That diminifhed feventh, which is the complement of the fuperfluous fecond to the octave, is the only one in ufe. It is a femitone major more than the fixth minor, as from C ♮ to B ♭.

Diminished *octave*, is a femi-tone minor, lefs than the octave, as from C to *c* ♭. It occurs fometimes in the baffes of inftrumental pieces of mufic. See Interval.

DIMINUE', *Fr.* is a term ufed in mufic for an extreme flat 7th, produced by a fharp to the loweft note, or a flat to the higheft; as $\frac{f\,♮}{G\,※}$ or $\frac{B\,♭}{C\,※}$.

DIMINUITO, *Ital.* an interval in mufic not accurate in its extent, that is, from being too flat, or too fharp, out of tune.

DIMINUTION, in *Architecture*, a contraction of the upper part of a column, whereby its diameter is made lefs than that of the lower part.

To attain thofe two important points in architecture, ftrength, and the appearance of ftrength, all architects have made their columns leffer above than below, which is called their diminution. Some have likewife made them a little bigger towards the middle than at the bottom, which is called their fwelling. The Gothic architects, indeed, obferve neither diminution nor fwelling; their columns are perfectly cylindrical; for which reafon they are properly called pillars, in contradiftinction to columns.

The diminution generally commences from one third of the height of the column. Some make it begin from the very bafis, and hold tapering to the capital; but that has not fo good an effect. Vitruvius would have the diminution of columns differ according to their height, and not according to their diameter: thus, a column of fifteen feet high, he diminifhes a fixth part of its diameter; and another of fifty feet

feet only an eighth part; but we do not find this rule obferved in the antique. The difference of orders, M. Perrault obferves, does not infer a difference of diminution, there being fmall and great diminutions in different works of the fame order; excepting, however, the Tufcan, which Vitruvius diminifhes by a fourth part, though Vignola only makes it a fifth, and the Trajan column a ninth. The diminutions are very differently adjufted in the different antique buildings, as well as by the different modern authors. For the method of diminifhing a column, fee Column.

Diminution, in *Heraldry*, a term ufed by Latin writers for what we more ufually call differences, and the French brifures. See Difference.

Diminution, in *Law*, is where the plaintiff or defendant in a writ of error alleges to the court, that part of the record remains in the inferior court not certified, and therefore prays that it may be certified by certiorari. Diminution cannot be alleged of what is fully certified, but of fomething that is wanting, as the want of an original, or a warrant of attorney.

Diminution, in the *Old Mufic*, is changing, in a canon, femibreves to minims. It likewife meant variations, divifions, breaking crotchets into quavers, quavers into femiquavers, &c.

Diminution, in *Rhetoric*, the augmenting and exaggerating what you have to fay, by an expreffion that feems to weaken and diminifh it.

As for inftance, when a man fays, with a certain tone, This woman is not ugly; meaning, fhe is very handfome.

Some authors take diminution in a ftricter fenfe, *viz.* for faying lefs than a man really means; as, You are not, indeed, to be commended; where a greater reproach is fecretly meant.

DIMINUTIONE, *Ital.* in *Mufic*, is one of the names given to figurative counterpoint, to diftinguifh mufic in parts of note againft note, or plain counterpoint from florid. See Diminuito.

DIMINUTIVE, in *Grammar*, a word formed from fome other, to foften or diminifh the force and effect thereof; or to fignify a thing that is little in its kind.

Thus cellule is a diminutive of cell, globule of globe; hillock of hill, &c.

The Italians abound in diminutives, every author being at liberty to make as many as he pleafes. The French are much more referved in that refpect, though their old authors were every whit as licentious as the Italians, witnefs Belleau, &c.

In Englifh we have very few; not that, as fome have faid of the French, our language is hard, and incapable of the fofteft expreffions, but becaufe we lay all our tendernefs in our fentiments; or rather, our language is tender, like a perfon of difcretion, who always fpeaks fenfe, even in fpeaking of his paffion.

In Latin, Italian, Englifh, and moft other tongues, diminutives are formed from primitives, by the addition of a few letters or fyllables: in French, the cafe is frequently otherwife, the diminutive being fometimes fhorter than the primitive, fometimes of the fame length.

They have a pleafing effect in that celebrated addrefs of Adrian to his departing foul, which begins,

"Animula, vagula, blandula
Hofpes comefque corporis, &c."

Some grammarians call *at leaft* a diminutive conjunction, as ferving to leffen or diminifh the force of what went before.

DIMISSORY Letters, *Literæ Dimifforiæ*, in the *Canon Law*, a letter given by a bifhop to a candidate for holy orders, having a title in his diocefe, directed to fome other bifhop, and giving leave for the bearer to be ordained by him.

When a perfon produces letters of ordination, or tonfure, conferred by any other than his own diocefan, he muft at the fame time produce the letters dimiffory, given by his own bifhop, on pain of nullity.

Letters dimiffory cannot be given by the chapter, fede vacante; this being deemed an act of voluntary jurifdiction, which ought to be referved to the fucceffor.

DIMITRIA, in *Geography*, a fort of Ruffian Tartary, on the Don, in the government of Caucafus; 12 miles N. of Ekaterinograd.

DIMITROW, a town of Poland, in the palatinate of Braclaw; 50 miles S. S. W. of Braclaw.

DIMITY is a kind of cotton cloth originally imported from India, and now manufactured in great quantities in various parts of Britain, efpecially in Lancafhire. Dr. Johnfon calls it dimitty, and defcribes it as a kind of fuftian. The diftinction between fuftian and dimity, in the fenfe in which thefe words are generally underftood, feems to be this; that the word fuftian is ufed to exprefs a common tweeled cotton cloth of a ftout fabric, upon which no ornament is woven in the loom; but which is moft frequently dyed after being woven. Dimity is alfo a ftout cotton cloth of a fimilar fabric; but is ornamented in the loom, either with ftripes or fanciful figures, and when woven is feldom dyed, but commonly bleached of a pure white. The ftriped dimities are the moft common, as they require lefs labour in weaving than the others, and the mounting of the looms being more fimple, and confequently lefs expenfive, they can be fold at much lower rates. For the plans of mounting both kinds, as generally practifed by weavers, fee the article Draught and *Cording*.

DIMIZA, in *Ancient Geography*, a town of Afia, in Media Minor.

DIMLU, in *Geography*, a ftrong city of Arabia, in the diftrict of Hodsjerie, a part of the Imam's dominions, feated upon a mountain, and called by Abulfeda the king's treafury; 20 miles E. S. E. of Taas.

DIMNAH, in *Ancient Geography*, a town of Zebulun, given to the Levites of Merari's family.

DIMNE, in *Geography*, a town of Arabia, in the country of Yemen; 12 miles S. S. E. of Dsjebi.

DIMNESS *of Sight*, in *Farriery*, a diforder in horfes, proceeding from blood-fhotten eyes. If the ball of the eye be found, the cure is effected by keeping the horfe warm, with a hood of linen cloth fitted to his head, and anointing the eye-lids twice a day with a compofition of fugar-candy, honey, and white rofe-water. In two or three days the eyes will be well, after which the creature fhould be blooded.

In this diforder the bladders on any part of the eye ought by no means to be clipped or meddled with. See Sight.

DIMOCARPUS, in *Botany*, a name given by Loureiro to the Chinefe fruits Litchi and Longan. See Scytalia.

DIMŒRITÆ, in *Ecclefiaftical Hiftory*, a name given to the Apollinarifts, who at firft held, that the Word only affumed a human body, without taking a reafonable foul like ours; but being at length convinced by formal texts of Scripture, they allowed, that he did affume a foul, but without underftanding; the Word fupplying the want of that faculty. From this way of feparating the underftanding from the foul, they became denominated dimœritæ, *q. d.* dividers, feparaters, of δια and μοιραω, *I divide*.

DIMON, Greater, in *Geography*, one of the Feroe iflands, lying half a Danifh mile S. S. E. from Skuoe, and $\frac{3}{4}$ of

¾ of a mile S. S. W. from Sandoe. Its length, from S. E. to N. W., is scarcely half a mile, and its breadth about one-eighth of a mile. The coast is almost every where high and steep, and is accessible only in two places, where only one person can ascend at a time; so that no island can be better fortified by nature. It is, indeed, impregnable; for it is impossible to starve the inhabitants, as it abounds with good fish and sea-fowls, and no ship can remain near it on account of the force of the currents. The fowls are so numerous, that at certain periods they almost darken the air, and stun the ears with their piercing cries. The whole population of the island consists of one family; and in summer, the only time when the clergyman can visit the church, it is necessary to hoist him up into the island by means of a rope. On the summit, however, the island is pretty level; but on account of the steepness of the coast, no boats can be kept here, and, therefore, the inhabitants live in a state of seclusion from other people, and can never quit their prison, except when some of the inhabitants of the other islands come to them with a boat.

Dimon, *Lesser*, another of the Feroe islands, which lies at the distance of ¾ of a Danish mile from the greater Dimon, and about the same from the Suderoe. It is a small uninhabited island, nearly of a circular form, $\frac{1}{6}$th of a mile in diameter. The surrounding coast is very steep, and is accessible only in three places. In form it resembles a hay stack, and, when visible, might serve as a land-mark to navigators. It abounds with sea-fowl, and contains a great number of wild sheep. The black wild sheep of this island are supposed to be a peculiar species; they are small in size, have short-curled wool, and do not readily mix with the others introduced into this island; their flesh, which has a dark appearance, in taste approaches to that of other wild animals. They shelter themselves from the severity of the weather in some natural caverns found in the island; and when the inhabitants of Suderoe come hither for a few days to catch sea-fowl, they take up their abode in caverns of the same kind.

DIMONA, in *Ancient Geography*, a town of Lower Mœsia, seated on the bank of the Danube.

Dimona, a town of Judea, in the southern part of the tribe of Judah, Joshua, xv. 22.

DIMORPHA, in *Botany*, (from δις, *double*, and μορφη, *form*, alluding to the differences of structure in the two genera of Aublet, which are by Schreber united into one under this name.) Schreb. Gen. 493. Willd. Sp. Pl. v. 3. 971. Mart. Mill. Dict. v. 2. (Parivoa; Aubl. Guian. v. 2. 756. t. 303, 304. Juss. 350. Eperua; Aubl. Guian. v. 1. 369. t. 142. Juss. 349. Panzera; Willd. Sp. Pl. v. 2. 540.) Class and order, *Diadelphia Decandria*. Nat. Ord. *Leguminosæ*, sect. 3. Juss.

Gen. Ch. *Cal.* Perianth of one leaf, rounded at the base, divided into three or four deep segments, obtuse. *Cor.* Petal one, very large, ventricose, rolled in at the sides, finely crenate, inserted into the calyx under the stamens, and placed at the lowermost side. *Stam.* Filaments diadelphous, (the simple one being at the opening between the edges of the petal, and the nine united ones lying against the middle of the petal,) all ascending, longer than the corolla; anthers oblong, quadrangular, incumbent. *Pist.* Germen stalked, compressed, short; style longer than the stamens; stigma simple. *Peric.* Legume large, oblique, compressed, of one cell. *Seeds* solitary, or very few.

Obs. The petal is single as in *Amorpha*, but it occupies the place of the keel, (not of the standard;) the latter, as well as the wings, are wanting. In the *Parivoa* of Aublet the legume is obovate, and single-seeded; in *Eperua* the filaments are thickened and villose at their base, (in his figure five only have anthers,) and the legume is scymitar-shaped, with three or four seeds. Schreb.

Ess. Ch. Calyx in three or four deep segments. Keel of one ample inflated petal. Wings and standard wanting. Legume compressed, with few seeds.

It is very probable that Jussieu and Willdenow may be right in keeping these two genera of Aublet distinct, but we have none of us sufficient materials to determine the point, Aublet's figures, made from dried specimens, and those specimens themselves, (in this case imperfect,) being our only guides, except his original French descriptions, of which the Latin is a translation. The only species known are,

1. D. *grandiflora*. Willd. Sp. Pl. v. 2. 971. (Parivoa grandiflora; Aubl. t. 303.) "Leaves abruptly pinnated. Legume smooth." A lofty tree found about the shores of creeks and rivers in Guiana, flowering in September. The *leaves* consist of three or four pair of ovate, pointed, stalked, shining leaflets, sometimes 3½ inches long. *Flowers* large, purplish, in terminal clusters. *Legume* thick, woody, containing one large seed. 2. D. *tomentosa*. Willd. (P. tomentosa; Aubl. t. 304.) "Leaves ternate or pinnate. Legume downy." Native of the same country, in moist meadows, and about rivers. This tree is about 25 feet high. *Leaves* of three or five leaflets. *Flowers* in terminal spikes, purplish, and agreeing in structure with those of the first species, but the *legume* is downy. 3. D. *falcata*. (Eperua falcata; Aubl. t. 142. Panzera falcata; Willd. Sp. Pl. v. 2. 540.) Leaves abruptly pinnated. Legume smooth, with three or four seeds. Found in the forests of Guiana, near rivers, flowering in September. The *trunk* is 50 or 60 feet high. The wood oily, lasting long in a moist situation, and preferred by the negroes for the handles of their hatchets. *Leaves* resembling those of the first species, but their leaflets are more elliptical. *Flowers* red, in clusters, on very long, axillary, compound, pendulous stalks. *Legume* seven inches long, scymitar-shaped, containing three or four flat seeds, of an irregular form.

DIMORPHOTHECA, a name given by Vaillant to a genus of plants, which Linnæus makes the same with the calendula.

DINA, in *Ancient Geography*, a lake of the Peloponnesus, in Arcadia. Pausanias.

DINABURG, in *Geography*, a town of Russia, in the government of Polotsk, seated on the Dwina; 80 miles N. W. of Polotsk, and 256 S. S. W. of Petersburg. N. lat. 56° 5′. E. long. 61° 46′.

DINAGEPOUR, a town of Hindoostan, in the country of Bengal; 85 miles N. of Moorshedabad, and 180 E. of Patna.

DINAITES, in *Scripture History*, a people who opposed the rebuilding of the temple. Ezra, iv. 9.

DINAN, a town of France, in the department of the Côtes du Nord, chief place of a district, situated on the river Rance, 18 miles S. of St. Malo, 36 N. W. of Rennes, and 270 N. W. of Paris. W. long. 1° 59′. N. lat. 48° 27′ 16″. It contains a population of 4170 individuals, and is divided into two parts, east and west, each of which is a separate canton. The east comprises six communes and 11,906 inhabitants; the west 13 communes, and 12,642 inhabitants. Both together have a territorial extent of 217½ kiliometres.

Dinan is one of the nine quarters of the maritime district of Brest, and has in its naval conscription the lesser places of Pleudihem, Plouer, Pleurtuit, Saint Egouat, Saint Briac, and Saint Jacut. But it is chiefly celebrated for its mineral waters, on which account it is much frequented even by foreigners. The water has been carefully analysed by Mr. Monnet

Monnet in 1769. It contains carbonate of iron, muriate of foda or potafh, and carbonate of earth, (carbonate terreux.) Its tafte is ferruginous. On iffuing from the fource it is perfectly pellucid, but if left expofed to the air it grows muddy, and leaves at the bottom of the veffel in which it is contained an ochreous fediment. The water then lofes its metallic tafte, and becomes infipid, like common water. It ought, therefore, to be drank at the fpring, and taken cold, as it is altered by heat. Its effects are aperitive, deterfive, aftringent, and corroborative. The ufe of this water is particularly recommended in female difeafes arifing from deficient or fuperabundant menftrual difcharges.

As chief place of a diftrict, Dinan has a fub-prefect, a court of juftice, and a regifter office. The whole diftrict contains 10 cantons, 92 communes, and 96,327 inhabitants, upon a territorial extent of 1460 kiliometres. The foil is good, and produces abundance of corn, hemp, and flax. Thefe articles, together with cattle, fifh, honey, wax, linen cloth, iron, and fome pottery, conftitute the principal trade of the diftrict of Dinan.

DINANT, a fmall town of France, in the department of Sambre and Meufe, chief place of a diftrict, fituated on the right fhore of the Meufe, between the river and a fteep rock, which renders it very narrow, 18 miles S. of Namur, 45 S. E. of Mons, 48 S. W. of Liege. Lat. 50° 15′. It has a population of 2964 individuals. The canton contains 36 communes and 10,051 inhabitants, upon a territorial extent of 245 kiliometres.

As chief place of a diftrict, Dinant has a fub-prefect, a court of juftice, and a regifter-office. The foil of the diftrict is tolerably fertile. There are fome iron mines, rich quarries of white, black, and red marble, copper founderies, forges, tan-yards and breweries. Leather, copper utenfils, bar-iron, wrought iron, and beer, conftitute the principal articles of trade.

The diftrict of Dinant comprifes five cantons, 137 communes, and 37,321 inhabitants, upon a territorial extent of 1177½ kiliometres.

Dinant, a bay of France, on the W. coaft of the department of Finifterre, in the Englifh channel, between Breft road and the bay of Douarnenez. N. lat. 48° 13′. W. long. 14° 43′.

DINAPORE, a village of Hindooftan, in the diftrict of Patna, lies about 14 cofs W. of Bankipore, one of the fuburbs of Patna, in which the Eaft India company's civil fervants refide. At Dinapore there is a military cantonment built by the company on the fame elegant and magnificent fcale with thofe at Berhampoor and Calcutta. It is fo extenfive that every officer enjoys nearly three times the accommodation afforded by any of the barracks in England. The private foldiers are alfo provided with large and well-aired lodgings; but the troops belonging to the native battalions are quartered in fmall tents, a little fuperior to thofe of the natives. For feveral miles around the adjoining villages of Bankipore and Dinapore, the fields affume the appearance of a rich and well-dreffed garden. The furface of the ground in this flat part of the province of Bahar does not rife more than 30 feet above the level of the Ganges; and in many places its level is ftill more inconfiderable. The water therefore is not more than two or three fathoms from the furface; and the method of raifing it is very fimple. Two long bamboos are raifed upon a frame about 10 or 12 feet, which are wrought like levers by a weight attached to one end, as the moving power which raifes the leathern bags to the mouth of the well. The moft common crops are cotton, dohl, and the caftor-oil plant, which latter rifes to the height of a large fhrub, and fhelters below its broad leaves the dohl and cotton fhrub. Barley alone, or mixed with a kind of fmall pea, is alfo a very common produce in this vicinity. Almoft every common article of food is here very cheap: fowls from fix to ten a rupee, and ducks at nearly the fame price. Wheaten bread is much cheaper than in Britain; though it is more expenfive than any other farinaceous food, and therefore not generally ufed by the natives. Tennant's Indian Recreations, vol. ii.

DINAR, a mountain of Perfia.

DINARITUM, in *Ancient Geography*, a promontory of the ifle of Cyprus, now *Capo St. Andrea*; placed by M. D'Anville at the moft eafterly point of the ifland, near the ifles called *Clides*.

DINAS-MAWDDWY, or Dinasmouthy, in *Geography*, a townfhip and market town in the parifh of Llan-y-Mowddû, or Mallwyd, in the hundred of Tallybont, Merionethfhire, Wales. It is feated on the river Dyfi, at the junction of three vallies, near a remarkable and romantic precipice called Craig-y-Dinas. Excepting the bold fcenery of the neighbourhood, this place does not prefent any objects, or events, of curiofity or intereft. It has a well fupplied market on Fridays, and three annual fairs. Here is a good bridge over the river: the church is more than a mile from the town. "That this was a place of more confequence than its prefent ftate indicates cannot be denied; indeed the annals of Wales (*vide* Warrington) notice it as having been the feat of a chieftain; and its vicinity the fcene of many a feat of valour and barbarity." (Evans's Tour through North Wales.) Mr. Evans infers that this town derived its name of Dinas from being a fortified palace of a prince; "and, as ufual, the diftrict around was endowed with feveral privileges and exemptions, which continued under the title of ancient ufages, till reftricted by the ftatutes of Henry VIII.; when the laws of England were generoufly extended to the conquered country." This place is the capital of an extenfive lordfhip belonging to the Mytton family. According to Pennant, it is governed by "a mayor, aldermen, recorder, and feveral burgeffes," the former tries criminals, and the recorder, in the abfence of the lord, hears and determines caufes of debt, &c. not exceeding forty fhillings. See Pennant's Tour in Wales, vol. ii.; and Evans's Tour through North Wales.

DINAW, a town of Poland, in the palatinate of Lemberg; 60 miles W. S.W. of Lemberg.

DINCKEL, a river of Germany, which runs into the Veehl, about feven miles N. from Nianhuys, in the county of Bentheim.—Alfo, a river of Germany, which runs into the Emmer, near Wobbel, in the county of Lippe.

DINDARI, in *Ancient Geography*, a people of Illyria, in Dalmatia.

DINDIGUL, in *Geography*, a town of India, in the Myfore country, capital of a diftrict or circar, to which it gives name; 51 miles S. W. of Tritchinopoly, and 70 S. E. of Coimbore. N. lat. 10° 23′. E. long. 78° 6′.

DINDYMIS, in *Ancient Geography*, one of the names of Cyzica, fituated in Afia Minor, at the foot of mount Didymos, on the borders of the Propontide.

DINDYMOS, a mountain of Afia Minor, in the peninfula of which Cyzica occupies the ifthmus. The mother of the gods had a temple in this mountain; it is thought to have been confecrated by the Argonauts.

DINESTONS, in *Geography*, a town of America, in the ftate of Pennfylvania; 25 miles E. of Pillfburg.

DING, in *Commerce*, a name which the Siamefe give in general to all forts of weights.

DINGAS, or *Bombay-barks*, in *Navigation*, are veffels ufed at Bombay and places adjacent, which are fometimes navigated

navigated by rowing with paddles. They have one maſt, one-third the length from the ſtern, which rakes much forward. On the maſt is hoiſted a ſail bent to a long yard, reſembling a ſettee-ſail: the laſh is made faſt to the head of the ſtern, and the ſheet to the keel of the maſt. Theſe veſſels never tack, but wear, in doing which they peek the yard againſt the maſt to ſhift the ſail; at the ſame time they paſs the ſheet before the maſt. Their rigging conſiſts of a pair of haliards, a bow-line, and brace. Their keels are very much hollowed upwards, to avoid wholly grounding on ſand-banks.

DINGE', in *Geography*, a town of France, in the department of the Ille and Vilaine and diſtrict of Dol; five leagues N. of Rennes.

DINGELFING, a ſmall town of Bavaria, ſituated on the river Iſer, in Lower Bavaria, between Landſhut and Straubing.

DINGELSTADT, a town of Germany, in the circle of the Lower Rhine, and county of Eichsfeld, on the Unſtrutt; 33 miles N. W. of Erfurt.

DINGLA, in *Ornithology*, the name given by Forſkal to the Larus *Cinerarius*.

DINGLE, in *Geography*, a market and poſt-town of the county of Kerry, Ireland: the Iriſh called it *Daingean-ni-Cuſhy; i e.* the faſtneſs or caſtle of Huſſey. In the reign of James I. a charter was granted to it under the name of *Dingle Cuſhy*, and it was ſince called *Dingle-i-Couch*, though the addition is now ſeldom made. It is ſituated on a harbour towards the north ſide of Caſtlemain bay, which is but a quarter of a mile broad at the entrance, but grows wider, and in which veſſels are protected from every wind. Ships of a hundred tons may come up to the town. Before queen Elizabeth's reign, ſeveral Spaniſh merchants reſided at Dingle, who traded with the natives for fiſh and other kinds of proviſions. Several of the houſes were built in the Spaniſh faſhion, with ranges of ſtone balcony windows. Dingle, beſides its export of butter and other articles of proviſions, has a manufacture of coarſe linen, which takes its name from the town, and is much uſed for ſheeting. It was formerly a borough town, but has loſt its privilege of returning members to parliament by the union. It is 164 Iriſh miles S. W. from Dublin. Latitude 52° 8′ N.; longitude 10° 7′ W. from Greenwich. Smith's Kerry.

DINGMANS, a town of America, in the ſtate of Pennſylvania; 75 miles N. of Philadelphia.

DINGWALL, anciently written *Dingaval*, is the name of a pariſh in Roſs-ſhire, Scotland, ſeated near the weſtern ſhore of the Frith of Cromarty. This diſtrict conſiſts of an extenſive valley, and the ſides of ſeveral hills, the greater part of which is well cultivated. Oats, barley, peaſe, beans, and wheat, are the chief produce. About 100 acres are appropriated to ſown graſs, 200 to paſture, and 900 to plantations. In this pariſh is Dingwall, an ancient royal borough, which was created ſuch by king Alexander II. in 1226. Its charter of that date was confirmed by James IV. and its inhabitants empowered to elect a provoſt, two bailiffs, dean of guild, treaſurer, and ten counſellors. It joins with Kirkwall, Wick, Dornock, and Tain, in returning one member to parliament. Here was formerly a ſeat, or family manſion of the earls of Roſs, and parts of an ancient caſtellated building, with moat, &c. ſtill remain. Into the latter, the water was admitted at high tides, and the whole was adapted to protect the poſſeſſor in times of warfare. From foundations of houſes that have been diſcovered at ſome diſtance from the preſent town, and other ſimilar evidence, it is juſtly inferred that the ancient borough exceeded the preſent in extent. It is, however, certain, that modern improvements have rendered the preſent place more comfortable and convenient for human habitation, trade, and ſocial intercourſe. Near the church is an obeliſk, which riſes from a baſe of ſix ſquare feet, to the height of 57 feet. It was erected to diſtinguiſh the burial place of the Cromarty family. The population of the pariſh, in 1791, was 1379. Sinclair's Statiſtical Account of Scotland.

DINHABAH, in *Ancient Geography*, a city of Edom. Gen. xxxvi. 32.

DINIA, Digne, a town of Gallia Narbonnenſis, and the capital of the Bodiontici, who lived near it. Its name is ſaid to be of Celtic original, derived from *din*, water, and *ia*, hot, ſo called from the thermal waters, at the diſtance of a quarter of a league from it. See Digne.

DINIÆ, a place of Aſia Minor, in Phrygia.

DININ, in *Geography*, a river of the county of Kilkenny, Ireland, which riſes in the mountainous diſtrict of Carlow weſt of the Barrow, and having received another ſtream from Caſtlecomer, joins the Nore a few miles above Kilkenny.

DINKELSBÜHL, or Dunkelspuhl, in Latin *Tricollis*, *Zeacollis*, or *Zeapolis*, an ancient town of Germany, on the river Wernitz, ſeated on three hills, was formerly a free imperial city, which, in the diet of the empire, held the ſixteenth place on the bench of the imperial towns in Swabia; but at the peace of Luneville it was given to the king of Bavaria, as part of the indemnities to which he was entitled for his loſſes on the weſtern ſhore of the Rhine. The inhabitants and the magiſtrates are half Lutherans and half Roman Catholics.

DINKELSCHERBEN, a ſmall town of Germany, in the circle of Swabia, formerly belonging to the biſhopric of Augſburg.

DINKIRA, a country of Africa, a little inland of the Gold coaſt, W. of Inta or Aſſiento, ſix days' journey from Axim, and five from Elmina. On the eaſt it has Aſſiento, or, as ſome ſay, the intermediate country of Cabaſterra, on the weſt Adom, and on the north unknown regions extending to Barbary. This kingdom was formerly confined within narrow limits, and thinly inhabited; but the natural valour of the inhabitants rendered them formidable to all their neighbours, except thoſe of Achem and Aſſiento, who always maintained their ſuperiority by their numbers. When the roads are free and open, the Dinkireſe merchants, and the Acheneſe, frequent the markets of Axim, Elmina, Commendo, and Cape Coaſt; but when they are ſhut up, they direct their commercial attention to the more diſtant parts of the coaſt, and there occaſion a great afflux of wealth at the inferior factories. The gold of Dinkira is naturally fine, but artfully mixed with the Fetiche gold. As to the Acheneſe, they carry on a great trade with the natives, both of the coaſt and of the interior countries. Such is their eſtabliſhed reputation for honeſty and fair dealing, that the merchants of Commendo and Simpa give their gold the name of "alkanney chienka," on account of its purity and genuine qualities. They are fierce, bold, and warlike, ſo that they are no leſs dreaded than eſteemed by their neighbours. In travelling through the adjacent countries, they are hoſpitably entertained without expence. Their arms are darts, ſcymitars, and bucklers: and their language is a kind of compound of thoſe of the neighbouring countries with which they keep up an intercourſe, blended with many Portugueſe words borrowed by their anceſtors during their commerce with that nation.

DINNAGE. See Dunnage.

DINNER, the great meal, or that taken about the middle of the day.

The word is formed from the French *diſner*, which Du-Cange derives from the barbarous Latin *diſnare*. Henry Stephens

Stephens derives it from the Greek δειπνειν; and will have it wrote *dipner*. Menage deduces it from the Italian *desinare*, to dine; and that from the Latin *desinere*, to leave off work.

The grand Tartar, emperor of China, after he has dined, makes publication by his heralds, that he gives leave for all the other kings and potentates of the earth to go to dinner; as if they waited for his leave.

In the general, it is agreed to be the most salutary to make a spare supper, and to eat the more plentifully at dinner, especially for tender, valetudinary people. This is the sentiment of the Schola Salernitana.

"Ex magna cœna stomacho fit maxima pœna:
Ut sis nocte levis, sit tibi cœna brevis."

Yet Bernardinus Paternus, an eminent Italian physician, maintains the contrary, in a treatise expressly on the subject.

The Romans, we are assured, never minded dinner; but deferred their good cheer to the evening, which they made their grand meal.

DINO, in *Biography*, a celebrated Italian jurist, was born about the middle of the 13th century. He studied law at Bologna, and, in 1279, was invited to take the chair in that faculty at Pistoia. Five years afterwards, he was appointed professor of Bologna, with a handsome stipend. In 1296, he refused an invitation to Naples sent by the king himself, and in the following year he removed to Rome, where Boniface VIII. employed him in compiling the sixth book of decretals published in 1298. As a recompence for this labour, he hoped for the office of cardinal, and to enable him to hold it, he separated from his wife, who entered into a convent, and enrolled himself in the clerical order: he did not succeed according to his expectations, and was obliged to resume the professorship. He died in 1303, leaving behind him several works of great authority. His commentary on the rules of law was so highly esteemed, that it was recommended to be committed to memory. He wrote treatises on "The Pandects;" and "De Actionibus," and his authority was so great at Verona, that in difficult points it was decreed, that the opinion of Dino should be decisive. Moreri.

DINOCRATES, a famous architect of Macedonia, who flourished about 330 years B. C. Having formed a variety of singular conceptions in the exercise of his profession, he wished to recommend himself to Alexander the Great, whilst this conqueror was atchieving his military exploits. Accordingly he joined his army, and obtaining access to Alexander, he proposed to him a scheme for laying out mount Athos into the form of a man, having in his left hand the walls of a great city, and all the rivers of the mountain flowing through his right hand into the sea. (See ATHOS.) Alexander, though seemingly pleased with the grand design, deferred the execution of it. Nevertheless, he took Dinocrates with him into Egypt, and employed him in marking out and building the city of Alexandria. He was also engaged by the Ephesians to superintend the re-building of the temple of Diana. (See DIANA.) The last great design which history ascribes to him was that of erecting a temple to Arsinoe, queen of Ptolemy Philadelphus, at Alexandria, having a dome above it, on which was to be inclosed a magnet, in order to keep suspended in the air an iron statue of that queen. Ptolemy approved the design, and gave orders for its execution; but both the king and the architect died before the project could be accomplished.

DINOGETIA, in *Ancient Geography*, a town of Lower Mœsia, called *Dirigathia*, *Demigutia*, and *Dinogessia*.

DINOSTRATES, in *Biography*, a famous mathematician of the Platonic school, the brother of Menechmus, and disciple of Plato. Pursuing the steps of his brother, who amplified the theory of the conic sections, Dinostrates is said to have made many geometrical discoveries; but he is particularly distinguished as the inventor of the *quadratrix*, which see. Montucla, however, observes (Hist. Mathem. v. i. p. 181.) that there is some reason for ascribing the original invention of this curve to Hippias of Elæa, an ingenious philosopher and geometer, contemporary with Socrates.

DINSLAKEN, in *Geography*, a town of Germany, in the circle of Westphalia, and duchy of Cleves; 23 miles S.E. of Cleves.

DINUS, in *Ancient Geography*, a port of Asia Minor, in Lycia.

DINUS, in *Medicine*, according to some, is the name of a disease, called more usually vertigo.

DINWIDDIE, in *Geography*, a county of America, in Virginia, S. of Appamatox river, which divides it from Chesterfield. It is about 30 miles long, and 20 broad, and its chief town is Petersburg. It contains 4987 free inhabitants, and 6866 slaves.

DIO, in *Biography*, a celebrated Stoic, who lived in the time of Nero, was a native of Prusa, in Bithynia, and denominated, on account of his eloquence, Chrysostom. Under Nero and Vespasian he maintained the profession of a Sophist: and frequently inveighed, in a declamatory and luxuriant style, against the most illustrious poets and philosophers of antiquity; which obliged him to leave Rome, and withdraw to Egypt. He then assumed the character of a Stoic philosopher; embellishing, however, his philosophical discourses, that treated of moral topics, with the graces of eloquence. As his character corresponded to his principles of virtue, he was a bold censor of vice, and spared no individual on account of his rank. By his freedom of speech he offended Domitian, and being obliged to become a voluntary exile in Thrace, he lived in great poverty, and supported himself by private labour. After the death of this emperor, he returned to Rome, and for some time remained concealed; but when he found the soldiers inclined to sedition, he brought to their recollection Dio the orator and philosopher, by haranguing them in a strain of manly eloquence, which soon subdued the tumult. He was admitted into the confidence of Nerva and Trajan, and distinguished by the former with tokens of favour. He lived to old age, but the time of his death cannot be ascertained. His "Orations" are still extant, from which we may infer that he was a man of sound judgment and lively fancy, and that he blended in his style the qualities of animation and sweetness. Brucker's Hist. Phil. by Enfield, vol. ii.

DIOCÆSAREA, in *Ancient Geography*, a town of Asia, placed by Pliny and Ptolemy in a country of Cappadocia. —Also, a town of Asia Minor situated on the river Calycadnus in the western part of Cilicia. Under the Philips, it was signalized by the title of metropolis. See SEPHORIS.

DIOCALLIA, in *Botany*, a name by which Apuleius and some other authors have called the common sweet chamomile.

DIOCESE, or DIOCESS, the circuit, or extent, of the jurisdiction of a bishop. See BISHOP.

The word is formed from the Greek διοικησις, *government*, *administration*, formed of διοικεω, which the ancient glossaries render *administro*, *moderor*, *ordino*: hence διοικησις της πολεως, the *administration*, or *government of a city*.

DIOCESE is also used, in *Ancient Authors*, &c. for the province of a metropolitan. See PROVINCE and METROPOLIS.

Diocæsis, Διοικεσις, was originally a civil government, or prefecture, composed of divers provinces.

The

The firſt diviſion of the empire into dioceſes is ordinarily aſcribed to Conſtantine, who diſtributed the whole Roman ſtate into four, *viz.* the dioceſe of Italy, the dioceſe of Illyria, that of the Eaſt, and that of Africa. And yet, long time before Conſtantine, Strabo, who wrote under Tiberius, takes notice, (lib. xiii. p. 432.) that the Romans had divided Aſia into dioceſes, and complains of the confuſion ſuch a diviſion occaſioned in geography; Aſia being no longer divided by people, but by dioceſes, each whereof had a tribunal, or court, where juſtice was adminiſtered. Conſtantine, then, was only the inſtitutor of thoſe large dioceſes, which comprehended ſeveral metropoles and governments; the former dioceſes only comprehending one juriſdiction, or diſtrict, or the country that had reſort to one judge, as appears from this paſſage in Strabo, and, before Strabo, from Cicero himſelf, (lib. iii. Epiſt. ad Famil. Ep. 9. and lib. xiii. Ep. 67.) who, when proconſul of Cilicia, often mentions the dioceſes that were annexed to his government: and alſo in his command of Capua, he calls himſelf the "episcopus" of the Campanian coaſt; which ſhews, that theſe names, which were afterwards appropriated in the Chriſtian church to characters and powers eccleſiaſtical, carried with them in their original uſe the notion of a real authority and juriſdiction. Thus, at firſt, a province included divers dioceſes, and afterwards a dioceſe came to compriſe divers provinces. In after-times the Roman empire became divided into thirteen dioceſes, or prefectures; though, including Rome, and the ſub-urbicary regions, there were fourteen. Theſe fourteen dioceſes comprehended a hundred and twenty provinces; each province had a pro-conſul, who reſided in the capital, or metropolis; and each dioceſe of the empire had a conſul, who reſided in the principal city of the diſtrict.

On this civil conſtitution the eccleſiaſtical one was afterwards regulated; each dioceſe had an eccleſiaſtical vicar, or primate, who judged finally of all the concerns of the church within his territory.

At preſent there is ſome farther alteration; for dioceſe does not now ſignify an aſſemblage of divers provinces, but is limited to a ſingle province, under a metropolitan, or even to the ſingle juriſdiction of a biſhop.

England, with regard to its eccleſiaſtical ſtate, is divided into two provinces, *viz.* Canterbury and York; the former province contains twenty-one dioceſes, and the latter three, beſides the biſhopric of the iſle of Man, which was annexed to the province of York by Henry VIII. Every dioceſe is divided into archdeaconries, of which there are ſixty in all; and each archdeaconry into rural deaneries; and every deanery into pariſhes.

The bounds of dioceſes are to be determined by witneſſes and records, but more particularly by the adminiſtration of divine offices. To which purpoſe there are two rules in the canon law; in one caſe, upon a diſpute between two biſhops on this head, the direction is, that they proceed in the buſineſs by ancient books and writings, and alſo by witneſſes, reputation, and other ſufficient proof; in the other caſe, where the queſtion was, by whom a church built upon the confines of two dioceſes ſhould be conſecrated, the rule laid down is, that it ſhould be conſecrated by the biſhop of that city, who, before it was founded, baptized the inhabitants, and adminiſtered to them other divine offices. The juriſdiction of the *city* is not included in the name of *dioceſe*, according to the canon law; and, therefore, in citations in general viſitations, directed to the clergy, it is ordered to cite the clergy of the *city* and *dioceſe*. A biſhop may perform divine offices, and uſe his epiſcopal habit, in the dioceſe of another, without leave, but may not perform there any act of juriſdiction, without permiſſion. A clergyman dwelling in one dioceſe, and beneficed in another, may, in different reſpects, be puniſhed in both; that is, the biſhop, in whoſe dioceſe he dwells, may proſecute him; but the ſentence, ſo far as it affects his benefice, muſt be carried into execution by the other biſhop. Gibſon, 133, 134.

Gul. Brito affirms dioceſe to be properly the territory and extent of a baptiſmal, or parochial church; whence divers authors uſe the word to ſignify a ſimple pariſh.

It is obſerved by lord King (Conſt. Diſcipl. &c. of the Primitive Church, p. 15.) that the ancient dioceſes are never ſaid to contain churches in the plural, but only a church in the ſingular. (See CHURCH.) As for the word dioceſe, by which the biſhop's flock is now uſually expreſſed, he ſays that he does not remember to have found it uſed in this ſenſe by any of the ancients; but they frequently denominated the biſhop's cure by the term pariſh. Thus, in the ſynodical epiſtles of Irenæus to pope Victor, the biſhoprics of Aſia are twice called pariſhes; and in Euſebius's Eccleſiaſtical Hiſtory the word is ſo applied in ſeveral hundred places. Accordingly, we often read of the biſhops of the pariſh of Alexandria, of Epheſus, of Corinth, of Athens, and of Carthage; and alſo of the biſhops of ſeveral other churches. This ingenious and impartial writer alleges ſeveral conſiderations, in order to ſhew, that the biſhop's dioceſe did not exceed the bounds of a modern pariſh, and that it was, really as well as nominally, the ſame. All the people of a dioceſe met all together every Sunday, in one place, to celebrate divine ſervice; and, therefore, the biſhop's church could not have been larger than our pariſhes, or elſe, it would have been impoſſible that the members of it ſhould have been conſtantly aſſembled together in one place. Further, the biſhop had but one altar, or communion-table, in his whole dioceſe, at which his whole flock received the ſacrament from him. Beſides, the other ſacrament of baptiſm was generally adminiſtered by the biſhops alone within their reſpective dioceſes; and, therefore, it is not probable, nor, indeed, ſcarcely poſſible, that their dioceſes were extended beyond the bulk of ſingle congregations. Moreover, the church's charity was depoſited with the biſhop; conſequently, that dioceſe could not be very large, where the biſhop perſonally relieved and ſuccoured all the poor that reſided in it. Again, all the people of a dioceſe were preſent at church-cenſures: and no offenders were reſtored again to the peace of the church, without the knowledge and conſent of the whole dioceſe. When the biſhop of a church was dead, all the people of that church met together in one place to chooſe a new biſhop. At the ordinations of the clergy, the whole body of the people were preſent. Public letters from one church to another were read before the whole dioceſe: and the whole dioceſe of the biſhop met together to manage church-affairs. From all theſe conſiderations, ſupported by citations from ancient writers, the author infers that a dioceſe, in the primitive ages of Chriſtianity, could not be larger than a ſingle congregation. This reaſoning is further confirmed by an inquiry into the real ſize of thoſe biſhoprics concerning which we have any notice on ancient records, whence it appears that the largeſt of them were not greater than our particular congregations. Accordingly, Ignatius gives ſuch an account of the biſhoprics of Smyrna, Epheſus, Magneſia, Philadelphia, and Trallium, as plainly proves that they were ſo many ſingle congregations. Upon the whole it is concluded, that the greateſt biſhoprics in the world, even in the third century, were no more than ſo many ſingle congregations. The four largeſt dioceſes, which ſubſiſted in thoſe days, were Antioch, Rome, Carthage, and Alexandria; the

the three former of which, during three centuries after Chrift, never branched themfelves into feparate congregations; though the latter did, on account of local circumftances, which rendered it inconvenient for all the members of this diocefe to affemble, at the ftated times of worfhip, in one and the fame place. This feparation, however, was not introduced till the third century, and was peculiar to the bifhopric of Alexandria.

Diocese, *Afiatic*. See Asiatic *Diocefe*.

DIOCLEA, in *Ancient Geography*, a town of Illyria, in Dalmatia, called by Ptolemy Doclea, the native place of Dioclefian. This town is now ruined; it was not far from Narona, now Narenza.

DIOCLEIA, Διοκλεια, in *Antiquity*, a folemnity kept in the fpring at Megara, in memory of the Athenian hero Diocles, who died in the defence of the youth he loved. Pott. Arcæol. Græc. lib. ii. cap. 20.

DIOCLES, in *Biography*, a mathematician who flourifhed about the fourth century; he invented the curve line denominated the cissoid of Diocles, and for this his name is chiefly celebrated. It is reckoned by fir Ifaac Newton among the defective hyperbolas, and is ufed for finding two mean proportionals between two other given lines. Moreri.

DIOCLESIAN, or Diocletian, in *Biography*, a Roman emperor, was born A.D. 245, at Dioclea, or Doclea, in Dalmatia, from which town he derived his firft name, which was probably Docles, afterwards lengthened to the Grecian harmony of Diocles, which was alfo the name of his mother; and, at length, after his acceffion to the empire, to the Roman majefty of Diocletianus or Dioclefianus. He likewife affumed the patrician name of Valerius. The parents of Dioclefian had been flaves in the houfe of Anulinus, a Roman fenator; but it is probable that his father obtained the freedom of the family, and that he foon acquired an office of fcribe, or regifter, which was commonly exercifed by perfons of his condition. Victor the Younger (Epit. p. 542.) reports, that he was himfelf, in his youth, flave to the fenator Anulinus, who gave him his liberty. At an early age he embraced the profeffion of arms, in which he muft have excelled, as he is reckoned among the good generals formed under the difcipline of Probus, and as he raifed himfelf to the firft military employments. At the commencement of his career, and whilft he occupied fome inferior poft, it is faid that a Druid woman, in whofe houfe he lodged, upbraided him with covetoufnefs; to whom he jocofely replied, "I fhall be more generous when I am emperor." "You are joking," replied the Druidefs; "but I tell you, in good earneft, that you will attain the empire after you have killed a boar." This circumftance is faid to have occurred in the city of Tongres, in the prefent bifhopric of Liege. In recompence of his fervices under Probus, he was promoted to the government of Mœfia, and having diftinguifhed himfelf in the expedition of Carus againft the Perfians, he was advanced by that prince to the confulfhip. At the time of Numerian's death, he held the honourable and important office of commander of the guards of the palace, or, as this office was called, "count of the domeftics."

On the 17th of September, A.D. 284, he was elevated to the imperial throne by the unanimous voice of the army. As foon as he was proclaimed, he afcended the tribunal, and, after having harangued the foldiers, and folemnly declared, upon oath, that he had not been acceffary or privy to the death of Numerian, he caufed Aper to be feized, reproached him in bitter terms with the murder of his prince and fon-in-law; and then defcending from the tribunal, plunged his fword in his breaft; faying, "You fhall have the honour, Aper, to fall by an illuftrious hand." Thus, it is faid, he fulfilled the prediction of the Druidefs, the word *Aper* fignifying a *boar*; and therefore, on feeing Aper falling, he cried out, "I have, at length, killed the fatal boar!" The epocha of Dioclefian's proclamation at Chalcedon forms a new era, for an account of which fee *Dioclefian* Epocha.

Dioclefian made his public entry into Nicomedia on the 27th of September of this year, 284. In the year 285, he commanded the troops that had lately returned from the Perfian war in a conteft with the infamous Carinus, brother of Numerian, who endeavoured to fupport his legal title to the empire. On this occafion the troops under his command fuffered a defeat, and Dioclefian defpaired both of the purple and of life. But the advantage which Carinus had obtained by the valour of his foldiers, he quickly loft by the infidelity of his officers. A tribune, whofe wife he had feduced, feized the opportunity of revenge, and, by a fingle blow, extinguifhed civil difcord in the blood of the adulterer. After the advantage thus gained, his conduct was fingularly mild and honourable. He not only pardoned all who had borne arms againft him, whom he juftly thought not blameable for having ferved a prince whofe title was fo legitimate as that of Carinus; but he alfo continued in their pofts and dignities thofe who had been promoted by his enemy. Motives of policy might, indeed, on this occafion, affift the humanity of Dioclefian. The difcerning judgment of Aurelian, of Probus, and of Carus, had filled the feveral departments of the ftate and army with officers of approved merit, whofe removal would have injured the public fervice, without promoting the intereft of the fucceffor. Such a conduct, however, difplayed to the Roman world the faireft profpect of the new reign; and the emperor affected to confirm this favourable prepoffeffion, by declaring that, among all the virtues of his predeceffors, he was the moft ambitious of imitating the humane philofophy of Marcus Antoninus. This is the account of Aurelius Victor; but Eutropius afferts that he was betrayed by his own army, and killed by Dioclefian.

When Dioclefian found himfelf, by the death of his rival, fole mafter of the empire, he marched to Rome, and, being acknowledged there, he fpent the winter at Nicomedia. In the mean while he vifited Germany, where he gained feveral advantages over the Alemanni, who had made an irruption into Gaul. In the fame year his generals fought with fuccefs againft the inhabitants of Britain, who had attempted to fhake off the yoke. On account of thefe victories he affumed the appellations of Germanicus and Britannicus, which we find on medals. From Germany he returned through Illyricum into the eaft; for he was at Sirmium on the firft day of the following year, and at Nicomedia on the 21ft of January. In the courfe of this year, *viz.* April 1, 286, he took Maximian, ftyled on the ancient coins M. Aurelius Valerius Maximianus, for his colleague and partner in the empire. (See Maximian.) On Maximian he beftowed at firft the title of Cæfar, and afterwards that of Auguftus. The motive that induced him to make this appointment feems to have been an apprehenfion that the numerous enemies with whom he had to contend, would be too powerful for him without the affiftance of a perfon of Maximian's military talents and bold enterprizing fpirit; for Dioclefian himfelf was lefs a warrior than a ftatefman, nor does he feem to have poffeffed the daring and generous fpirit of a hero, who courts danger and fame, difdains artifice, and boldly challenges the allegiance of his equals. Maximian he had long known; he was well acquainted with his ruling difpofition and general character; his fidelity and attachment he had long experienced; and he was fufficiently affured that he would ferve the purpofes for which he was appointed, and,

and, at the fame time, affume no independent authority and command. Of his vices alfo Dioclefian was well apprized, and he knew how to render them ufeful. Infenfible to pity, and fearlefs of confequences, he was the ready inftrument of every act of cruelty which the policy of that artful prince might at once fuggeft and difdain. As foon as a bloody facrifice had been offered to prudence or revenge, Dioclefian, by his feafonable interceffion, faved the remaining few, whom he had never defigned to punifh, cenfured the feverity of his ftern colleague, and enjoyed the comparifon of a golden and an iron age, which are univerfally applied to their oppofite maxims of government. Notwithftanding the difference of their characters, the two emperors maintained, on the throne, that friendfhip which they had contracted in a private ftation. The haughty turbulent fpirit of Maximian, fo fatal afterwards to himfelf and the public peace, was accuftomed to refpect the genius of Dioclefian, and confeffed the afcendant of reafon over brutal violence. From a motive either of pride or fuperftition, the two emperors affumed the titles, the one of Jovius, the other of Herculius: though Crevier fays, that thefe were names afterwards conferred on the two Cæfars, Galerius and Conftantius.

Dioclefian, after having affociated Maximian, prepared to march againft the Perfians, and charged his colleague with the war in the weft, who juftified the choice that had been made by the fignal fuccefs of his arms. Dioclefian himfelf, though no great warrior, was not inactive. By the terror of his name he induced the king of Perfia to fue for peace; and his panegyrifts mention the victories which he gained over the Alemanni in Rhætia, and over the Sarmatians, whence he was called Sarmaticus, the Juthongi, the Quadi, the Carpians, and the Goths, in Pannonia and the neighbouring countries. After thefe exploits of the two emperors, for which they obtained a triumph, they had an interview at Milan, A.D. 290. In order to repair thither, they croffed, in the midft of winter, one of them the Julian Alps in his way from Pannonia, and the other the Cottian Alps, which are thofe neareft Gaul. What was the motive of this interview hiftory has not recorded: but if it merely ferved to exhibit the cordial union that fubfifted between them, it muft greatly contribute to maintain peace and tranquillity in the empire. However, new dangers prefented themfelves, and therefore the two emperors determined to ftrengthen their power and intereft, by conferring on two generals of approved merit, with the inferior title of *Cæfars*, an equal fhare of the fovereign authority. This event took place, A.D. 292. Galerius, furnamed Armentarius, from his original profeffion of a herdfman, and Conftantius, who from his pale complexion had acquired the denomination of Chlorus, were the two perfons invefted with the fecond honours of the imperial purple. The two emperors, in order the better to cement the union between them and their Cæfars, obliged them to repudiate their wives, and ally themfelves to the imperial families. Accordingly, Conftantius married Theodora, daughter-in-law to Maximian; and Galerius efspoufed Valeria, the daughter of Dioclefian. Thefe four princes diftributed among themfelves the wide extent of the Roman empire. The defence of Gaul, Spain, and Britain, was entrufted to Conftantius; Galerius was ftationed on the banks of the Danube, as the fafeguard of the Illyrian provinces; Italy and Africa were confidered as the department of Maximian; and for his peculiar portion, Dioclefian referved Thrace, Egypt, and the rich countries of Afia. Every one was fovereign within his own jurifdiction, but their united authority extended over the whole monarchy; and each of them was prepared to affift his colleagues with his counfels or prefence. After the adoption of the two Cæfars, the emperors themfelves, retiring to a lefs laborious fcene of action, devolved on their adopted fons the defence of the Danube and of the Rhine. The vigilant Galerius was never reduced to the neceffity of vanquifhing an army of barbarians on the Roman territory. The brave and active Conftantius delivered Gaul from a very furious inroad of the Alemanni; and his victories of Langres and Vindoniffa appear to have been actions of confiderable danger and merit. In the difpofal of the captive barbarians, Dioclefian and his affociates imitated the conduct of Probus, and diftributed them among the provincials, and thofe diftricts were affigned them, which had been depopulated by the calamities of war. They were ufefully employed as fhepherds and hufbandmen, but were denied the exercife of arms, except when it was found expedient to enrol them in the military fervice. While the Cæfars were exercifing their valour on the banks of the Rhine and Danube, the emperors were called to the fouthern confines of the Roman world. From the Nile to mount Atlas, Africa was in arms. A confederacy of five Moorifh nations, called Quinque-gentiani, iffued from their deferts to invade the peaceful provinces. Julian had affumed the purple at Carthage. Achilleus at Alexandria; and the Blemmyes, fcattered between the ifland of Meroe and the Red fea, continued their incurfions into Upper Egypt. Although we have no particular detail of the exploits of Maximian in weftern Africa, we know in general that he vanquifhed the fierceft barbarians of Mauritania. Dioclefian undertook the fiege of Alexandria, occupied by Achilleus, and having profecuted it for eight months, the city fubmitted, but experienced the full extent of his feverity. Many thoufands of the citizens perifhed in a promifcuous flaughter. The fate of Bufiris and Coptos was ftill more melancholy than that of Alexandria. Whilft Dioclefian vigoroufly chaftifed the paft crimes of the Egyptians, he provided for their future welfare by many wife regulations, which were confirmed and enforced under the fucceeding reigns. He alfo by an edict fuppreffed all books of alchemy which the Arabs, by the conqueft of Egypt, had been the means of diffufing over the globe. The reduction of Egypt was immediately followed by the Perfian war. It commenced A.D. 296; at which time Dioclefian fixed his ftation in the city of Antioch, from whence he prepared and directed the military operations. Galerius had the charge of the Roman legions; but after two battles of various and doubtful fuccefs, he was totally defeated in a third engagement, the difafter of which was attributed to his own rafhnefs in prefuming, with an inconfiderable body of troops, to attack the innumerable hoft of the Perfians. When he returned to Antioch, Dioclefian received him, not with the ufual expreffions of friendfhip, but with the indignation of an offended fovereign. The haughtieft of men, clothed in his purple, but humbled by the fenfe of his misfortune and difgrace, was obliged to follow the emperor's chariot above a mile on foot, and to exhibit, before the whole court, the fpectacle of his difgrace. Dioclefian, however, having indulged his refentment, and afferted the majefty of fupreme power, allowed Galerius, at his earneft entreaty, to retrieve his own honour, as well as that of the Roman name. A ftrong force was provided for him, and at the head of a chofen army of 25,000 men, he again paffed the Euphrates, and by his circumfpection and valour obtained a complete victory over the Perfian army. In the general confufion and carnage, Narfes, the wounded monarch, fled towards the deferts of Media, and left behind him an immenfe booty to the conqueror. Several of his wives, his fifters, and children, were in the number of the captives, who were honourably protected from violence and rapine, conveyed

veyed to a place of ſafety, and treated with every mark of tenderneſs and reſpect that was due from a generous army to their age, their ſex, and their royal dignity. The emperor Diocleſian, who had aſſembled in Syria a ſtrong army of obſervation, and was anxiouſly waiting the event, as ſoon as he received intelligence of the victory, advanced towards the frontier, in order, by his preſence and counſels, to moderate the pride of Galerius. The interview of the Roman princes at Niſibis was accompanied with every expreſſion of reſpect on one ſide, and of eſteem on the other. Here they ſoon afterwards gave audiences to the ambaſſador of the great king. In the conference that enſued, Galerius manifeſted the fierceneſs of his paſſion, as well as his deference to the ſuperior wiſdom and authority of Diocleſian. The ambition of the former graſped at the conqueſt of the eaſt, and had propoſed to reduce Perſia into the ſtate of a province. The prudence of the latter, who adhered to the moderate policy of Auguſtus and the Antonines, embraced the favourable opportunity of terminating a ſucceſsful war by an honourable and advantageous peace. Accordingly, after the adjuſtment of ſome previous circumſtances, a ſolemn peace was concluded and ratified between the two nations.

The conditions of this peace were, that Narſes ſhould cede to the Romans five provinces beyond the Tigris, *viz.* Intilene, Zabdicene, Arzanene, Sophene, and Carduene, which by their ſituation formed a very uſeful barrier, and whoſe natural ſtrength was ſoon improved by art and military ſkill;—that the Aboras, or as Xenophon calls it, the Araxes, ſhould be the boundary between the two monarchies: and not the Tigris, as ſome authors have ſtated in conſequence of an error of the geographer Ptolemy, who removed the poſition of Singara from the Aboras to the Tigris; by this article of the treaty Meſopotamia, which had been the object of many wars, was ceded to the empire, and the Perſians renounced all pretenſions to that great province:—that the limits of Armenia ſhould be extended to the fortreſs of Sintha or Zintha, on the confines of Media:—that the king of Iberia ſhould receive his crown from the Roman emperors, and be no longer dependent on the kings of Perſia:—and that Niſibis ſhould be a common emporium or mart of commerce between the two empires; but to this latter article Narſes objected, whilſt he complied with all the reſt. The wives and children of the Perſian king were reſtored to him; but the other priſoners were retained by Diocleſian to grace his ſubſequent triumph. This peace was very advantageous to the Romans, and laſted 40 years, from the year 297, when the war terminated, to the year 337, when Conſtantine, provoked by Sapor, who wanted to withdraw the five provinces ceded to Diocleſian, would have made war againſt the Perſians, if he had not been prevented by death. Galerius's victory over Narſes, though glorious to the Roman empire, was fatal to Diocleſian. It ſwelled the pride of the conqueror, who aſſumed the pompous titles of Perſicus, Armeniacus, Adiabenicus, and Mediacus: and diſdaining a mortal origin, ſtyled himſelf the ſon of Mars. Although he was treated with high diſtinction by his adoptive father and emperor, he became weary of holding only the ſecond rank. "Always Cæſar," ſaid he, "How long will it be till I ſhall be nothing but Cæſar?" At length, gaining an aſcendant over Diocleſian, he prevailed on him to perſecute the Chriſtians, and reduced him to the neceſſity of abdicating the empire. During the five years that elapſed between the peace concluded with the Perſians, and the perſecution ordered againſt the Chriſtians, Diocleſian employed his time chiefly in providing for the internal welfare of the empire, and in ſecuring its frontiers by caſtles built upon the Rhine, the Danube, and the Euphrates. Ammianus Marcellinus particularly mentions Cercuſium, or Circeſium, in Meſopotamia, a frontier town, at the confluence of the Aboras and the Euphrates, which he ſtrongly fortified, and thus rendered an important poſt. It was alſo, during this ſame interval of tranquillity, that Diocleſian erected his magnificent and expenſive buildings at Nicomedia, and that baths were conſtructed by Maximian at Carthage. In the year 302, a great ſcarcity prevailed in moſt provinces of the empire; and Procopius ſays, that Diocleſian ordered two millions of buſhels of corn to be yearly diſtributed among the inhabitants of Antioch, and a ſimilar diſtribution was made in the city of Alexandria. Galerius paſſed the winter of this year with Diocleſian in the palace of Nicomedia; and the fate of Chriſtianity became the object of their ſecret conſultations. Galerius had been brought up in hatred of the Chriſtian name by his mother, a woman extremely ſuperſtitious, who, offering frequent ſacrifices in her village to the pretended deities of the mountains, had taken great offence at the Chriſtians, becauſe they refuſed to partake of the repaſts which ſhe gave at the ſame time, and becauſe they faſted and prayed whilſt ſhe celebrated feaſts of joy with the inhabitants of the place. Galerius, no leſs ſuperſtitious than his mother, and full of the prejudices which he had imbibed from her inſtruction, embraced the firſt favourable opportunity of converſing with the emperor, and diſpoſing him to concur in meaſures of perſecution. A circumſtance is ſaid to have occurred which promoted the views of Galerius. As the emperor was offering ſacrifices in order to aſcertain the will of the gods, by inſpecting the entrails of animals, concerning the events of futurity, the Chriſtians diſturbed the prieſts in the performance of their office; and as theſe miniſters of ſuperſtition and deluſion were unable to give the emperor the ſatisfaction which he deſired, they alleged the interference of profane perſons, as they called Chriſtians, and charged upon them the failure of their ſucceſs. The emperor was incenſed; and puniſhed both the officers of the palace and army, who would not join in his ſacrifices. Galerius took the advantage of this circumſtance; and in his converſation with Diocleſian uſed a variety of arguments to induce him to commence and afterwards to extend the horrid work of perſecution. The emperor himſelf was rather inclined to meaſures of lenity, and though he readily conſented to exclude the Chriſtians from holding any employments in the houſehold or the army, he urged in the ſtrongeſt terms the danger, as well as cruelty, of ſhedding the blood of thoſe deluded fanatics, as he ſeemed to regard them. At length, however, Galerius prevailed; a council was ſummoned, conſiſting of the principal perſons in the civil and military departments of the ſtate: violent meaſures were recommended; and Diocleſian yielded and acquieſced. On the 23d of February, A.D. 303, the perſecution commenced by the demolition of the church of Nicomedia; and on the next day the general edict was publiſhed; and it was enacted, that the churches of the Chriſtians, in all the provinces of the empire, ſhould be demoliſhed to their foundations; and the puniſhment of death was denounced againſt all who ſhould preſume to hold any ſecret aſſemblies for the purpoſe of religious worſhip. Their ſacred books were commanded to be publicly burnt; the property of the church was confiſcated: and in order to induce individuals, who were found to be obſtinate in their attachment to their Chriſtian profeſſion, to abandon it, and to prevent others from rejecting the religion of nature, of Rome, and of their anceſtors, violent meaſures of various kinds were purſued. Perſons of a liberal birth were declared incapable of holding any honours or employments; ſlaves were for ever deprived

of

of the hopes of freedom, and the whole body of the people were put out of the protection of the law. The judges were authorised to hear and to determine every action that was brought against the Christians; but the Christians were not permitted to complain of any injury which they themselves had suffered, and thus they were exposed to the severity, whilst they were excluded from the benefits of public justice. This edict was scarcely exhibited to public view, in the most conspicuous place of Nicomedia, before it was torn down by the hands of a Christian, who is said, at the same time, to have expressed, by the bitterest invectives, his contempt as well as abhorrence of such tyrannical governors. For this act of contumacy he was burnt, or rather roasted by a slow fire; but his executioners were unable, by this refinement of cruelty, to subdue his patience, or to make him to alter the steady and insulting smile which, in his dying agonies, he still exhibited in his countenance. Within 15 days after the first edict was issued, the palace of Nicomedia, and even the bed-chamber of Dioclesian, were twice in flames; and though they were extinguished without any material damage, the repetition of the fire was considered as a convincing proof, that it was not the effect of chance or negligence. Eusebius writes, that he could never learn how that accident had happened. Constantine, who was on the spot, ascribes it to lightning: and Lactantius assures us, that Galerius caused the palace to be privately set on fire, that he might accuse the Christians, and by that calumny incense Dioclesian still more against them. It did produce this effect; for Dioclesian, ascribing it to the Christians, resolved to punish them with the utmost severity: and Galerius, the more to exasperate him against them, withdrew from Nicomedia the same day, pretending that he was afraid of being burnt alive by those incendiaries. For a further account of this persecution, which was extremely grievous, and which lasted ten years; see PERSECUTION.

The arduous work of rescuing the distressed empire from tyrants and barbarians having been completely atchieved, and Dioclesian having entered into the twentieth year of his reign, A.D. 303, he celebrated that memorable era, as well as the success of his arms, by the pomp of a Roman triumph. Maximian, the only equal partner of his power, was his only companion in the glory of that day. This triumph, which was dignified and splendid, was the last that Rome ever beheld; for soon after this period, the emperors ceased to vanquish, and Rome ceased to be a capital of the empire. Whilst Maximian fixed his residence at Milan, Dioclesian employed his leisure, and the wealth of the East, in embellishing Nicomedia, a city placed on the verge of Europe and Asia, and almost at an equal distance between the Danube and the Euphrates; which, in process of time, was inferior only to Rome, Alexandria, and Antioch, in extent or populousness. As Dioclesian had framed a new system of imperial government, which was afterwards completed by the family of Constantine, he adopted every measure that tended to debase Rome, and the Roman senate. Civil magistracies, and their modest titles of consul, proconsul, censor, and tribune, were laid aside, and imperial dignity and corresponding titles were assumed. Even the attributes, or at least the titles of the divinity, were usurped by Dioclesian and Maximian, who transmitted them to a succession of Christian emperors. Dioclesian introduced the stately magnificence of the Persian court; he assumed the diadem, though detested by the Romans, as the odious ensign of royalty; and his sumptuous robes, and those of his successors, were of silk and gold; and it is remarked with indignation, that even their shoes were studded with the most precious gems. Access to their sacred persons was every day rendered more difficult, by the institution of new forms and ceremonies. The avenues of the palace were strictly guarded; and the interior apartments were entrusted to the jealous vigilance of eunuchs, the increase of whose number and influence was the most infallible symptom of the progress of despotism. When a subject was at length introduced into the imperial presence, he was obliged, whatever might be his rank, to fall prostrate on the ground, and to adore, according to the Eastern fashion, the divinity of his lord and master. The first principle of the new system instituted by Dioclesian, was ostentation, and the second division; for he divided the empire, the provinces, and every branch of the civil, as well as military administration; and this principle of division, in the course of a few years, occasioned the perpetual separation of the eastern and western empires under the system introduced by Dioclesian. The number of ministers, of magistrates, of officers, and of servants, who filled the different departments of state, was multiplied beyond all former example; and of course his system was accompanied with a more expensive establishment, and consequently an increase of taxes, and the oppression of the people. Dioclesian, after this ceremony of his triumph, left Italy, and commenced his progress towards the circuit of his Illyrian provinces. The fatigue of the journey, and the inclemency of the weather, occasioned a disorder, which, before he arrived at Nicomedia, towards the end of the summer, A.D. 304, became very serious and alarming. During the whole winter he was confined to his palace; and his danger occasioned a very general alarm. The rumour of his death was circulated, and very generally believed; and it was thought that the event was kept concealed till the arrival of Galerius, lest the soldiers should, in the mean time, according to custom, proclaim a new emperor. At length, however, on the 1st of March, A.D. 305, he once more appeared in public, but so pale and emaciated, that he could scarcely have been recognized by those to whom his person was the most familiar. Galerius, who had already threatened Maximian with a civil war, if he did not resign the empire, arrived about this time at Nicomedia; with a view of obliging Dioclesian likewise to surrender the sovereignty, since he was no longer able to discharge the functions of the imperial dignity. Whilst the emperor demurred, offering, however, to share the empire with him and Constantius, Galerius told him plainly, that if he did not resign willingly, he would force him to abdicate. It was at length agreed, that Dioclesian and Maximian should renounce the sovereignty; that Constantius and Galerius should, at the same time, be vested with it; and that, in order to preserve the form of government introduced by Dioclesian, two new Cæsars should be appointed. These measures, on the part of the ambitious Galerius, hastened the execution of the purpose, which Dioclesian had previously formed, even during the splendour of a Roman triumph. Accordingly the ceremony of his abdication was performed on the 1st of May, A.D. 305, in a spacious plain, about three miles from Nicomedia. The emperor ascended a lofty throne, and in a speech, full of reason and dignity, declared his intention, both to the people and the soldiery, who were assembled on this extraordinary occasion. As soon as he had divested himself of the purple, and delivered it to Maximin, whom at the same time he declared Cæsar, together with Severus, he withdrew from the gazing multitude; and traversing the city in a covered chariot, he proceeded without delay to the favourite retirement which he had chosen in his native country of Dalmatia. On the same day Maximian, as it had been previously concerted between the two emperors, made his resignation of the imperial dignity at Milan, trans-

ferring the purple to Severus, and declaring Conftantius and Galerius emperors, as Dioclefian had done, he retired to Lucania. Lactantius afcribes the refignation of Maximian and Dioclefian to the intrigues and menaces of Galerius, and to the apprehenfion of a civil war, which his ambition led them to entertain. Conftantine, however, who was then at Nicomedia, and lodged in the fame palace with Dioclefian, affures us that the emperor, thinking himfelf no longer able to govern, on account of the fits to which he was fubject, refigned of his own accord; and the panegyrifts, who wrote at that time, mention his refignation as a fhining inftance of greatnefs, generofity, and an utter contempt of all human grandeur; and affert that both he and Maximian had agreed long before, and even bound themfelves by a folemn oath in the capital, to refign the fovereignty. Dioclefian paffed the laft nine years of his life at a country feat in the neighbourhood of Salona, on the fpot where the city of Spalatro was afterwards built. About fix or feven miles from the city of Salona he conftructed a magnificent palace, fome remains of which are ftill vifible; for an account of which fee SALONA.

In this retirement Dioclefian employed his leifure hours in building, planting, and gardening. His anfwer to Maximian is defervedly celebrated. When he was earneftly folicited by that reftlefs old man to refume the reins of government and the imperial purple, he rejected the temptation with a fmile of pity, calmly obferving, that if he could fhew Maximian the pot-herbs which he had planted with his own hands at Salona, he fhould no longer be urged to relinquifh the enjoyment of happinefs for the purfuit of power. In his converfation with his friends, he often acknowledged, that, of all arts, the moft difficult was that of reigning; and he expreffed himfelf on that topic with a degree of warmth which could only be the refult of experience. "How often, as he was accuftomed to fay, is it the intereft of four or five minifters to combine together, to deceive their fovereign? Secluded from mankind by his exalted dignity, the truth is concealed from his knowledge: he can fee only with their eyes, he hears nothing but their mifreprefentations. He confers the moft important offices upon vice and weaknefs, and difgraces the moft virtuous and deferving among his fubjects. By fuch infamous acts, added Dioclefian, the beft and wifeft princes are fold to the venal corruption of their courtiers." (Hift. Auguft. p. 223, 224.) Although Dioclefian had retired from the diftracting anxieties of government, he could not in his privacy remain ignorant of the troubles that afflicted the empire after his abdication, nor could he be indifferent to their confequences. His tendernefs, or at leaft his pride, was deeply wounded by the misfortunes of his wife, Prifle, and daughter Valeria, who, under the reign of Conftantine, were both condemned and publicly executed, and their bodies were afterwards thrown into the fea; and the laft moments of Dioclefian were embittered by fome affronts, which Licinius and Conftantine might have fpared the father of fo many emperors, and the firft author of their own fortune. Before his death, which happened at Salona, in the ninth year after his abdication, the 21ft of his reign, the 68th of his age, and the 313th year of Chrift, he was feized with an agitation of body and of mind, which allowed him no reft either day or night, but he rolled himfelf fometimes on the ground, and fpent his whole time in fighs, groans, and tears. According to fome authors, he either ftarved or poifoned himfelf. His memory was much refpected, and a magnificent tomb was erected to him, which was ftill covered with purple in the time of Conftantius, the fon of Conftantine. He was ranked among the gods; a prerogative, fays Eutropius, which never was beftowed upon any other man who died in a private ftation. This apotheofis cannot be laid to the charge of Conftantine, who then profeffed himfelf a Chriftian; but it muft be imputed to Licinius and Maximin, who had offended Dioclefian whilft he lived, and who, without any charge to themfelves, might honour him after he was dead.

The abilities of Dioclefian, fays Gibbon, were ufeful rather than fplendid; he poffeffed a vigorous mind, improved by the experience and ftudy of mankind; dexterity and application in bufinefs, a judicious mixture of liberality and economy, of mildnefs and rigour; profound diffimulation under the difguife of military franknefs; fteadinefs to purfue his ends; flexibility to vary his means; and, above all, the great art of fubmitting his own paffions, as well as thofe of others, to the intereft of his ambition, and of colouring his ambition with the moft fpecious pretences of juftice and public utility. Like Auguftus, Dioclefian may be confidered as the founder of a new empire. Like the adopted fon of Cæfar, he was diftinguifhed as a ftatefman rather than as a warrior; nor did either of thofe princes employ force, whenever their purpofe could be effected by policy. Libanius writes (Orat. xiv.) that Dioclefian fhewed himfelf in many, but not in all things, an excellent prince; and the emperor Julian (Orat. i.) commends him for having done many things that proved very ufeful to the public. He enacted many excellent laws, feveral of which are inferted in the code, and he was fo far from encouraging informers, that he commanded them to be executed when they could not fupport their charge. He encouraged and preferred perfons of merit and virtue, difcountenanced vice, encouraged the worfhip of the gods, and was, till feduced by Galerius, rather a friend than an enemy to the Chriftians, of whom he had, till the year 303, great numbers both in his court and in his army. He was attentive to make plenty reign in his capital, in the armies, and in the whole empire. Neverthelefs, with fo many qualities worthy of efteem, he knew little of the art of rendering himfelf amiable; and though he gloried in imitating Marcus Aurelius, he was far from copying his goodnefs. Befides the cruel perfecution which he ordered againft the Chriftians, his government tended to the oppreffion of the people. All hiftory reproaches him with pride, oftentation, and arrogance. Even his prudence degenerated into artifice and cunning, and infpired fentiments of fufpicion and diftruft. His economy bordered on avarice, and, if we may believe Lactantius, was fometimes enforced with cruelty. It has been obferved by Aurelius Victor, that no connection with him juftified confidence, and that thofe whom he called his friends could not depend upon a fincere affection on his part. He was greatly addicted to building: and embellifhed the feveral cities of the empire, particularly Rome, Carthage, Milan, and Nicomedia, with many ftately edifices. Lactantius much blames him for his rage of building. At Nicomedia he indulged this paffion to an extravagant and injurious degree. Here, fays our author, he built a bafilic, there a circus, in another place a mint, and elfewhere an arfenal. For his wife he built a palace, and another for his daughter. In order to make room for thofe new edifices, a great part of the city was taken from its inhabitants, who were obliged to migrate with their wives and children, as if their country had been feized by enemies. When thefe buildings were finifhed, to the ruin of the provinces; they were again executed upon another plan. Then they were again pulled down and altered, perhaps to be again deftroyed. Such was the madnefs which he manifefted in his vain ambition of making Nicomedia equal to Rome. At Rome his baths were an immenfe building, the vaft circumference of which, if it cannot, without hyperbole, be compared with an ancient writer, (Ammian l. xvi.) to the extent of a province, is, at

leaft,

leaſt, greater than that of many cities. In this building, beſides baths, were walks, places for exerciſe, and others for ſtudy; rows of trees, porticoes, great halls, and libraries. Crevier's Rom. Emp. vol. ix. x. Anc. Univ. Hiſt. vol. xiv. Gibbon's Hiſt. vol. ii.

DIOCLETIANOPOLIS, in *Ancient Geography*, an epiſcopal town of Thrace.—Alſo, an epiſcopal town of Phrygia.

DIOCLIA, in an epiſcopal town of Aſia, in the Pacatian Phrygia.

DIOCTAHÆDRIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek δις, *twice*, οκτω, *eight*, and εδρα, *a ſide*. The bodies of this genus are ſpars compoſed of twice eight planes, or two octangular pyramids joined baſe to baſe, without any intermediate column. Hill's Hiſt. of Foſſ. p. 211.

DIODATI, John, in *Biography*, a celebrated preacher at Geneva, was born at Lucca about the year 1589, of a noble family of the Catholic perſuaſion, but having, at an early age, embraced the Proteſtant faith, he went to Geneva, where he ſtudied with ſo much ſucceſs, as, at the age of nineteen, to be deemed qualified for the profeſſorſhip of Hebrew in that univerſity. He was ſoon advanced to the theological chair, and acquired a high reputation as a preacher. In 1619, he was deputed with M. Tronchin to repreſent the Genevan clergy in the ſynod of Dort. Here he acted his part ſo well, that he was appointed one of ſix miniſters to draw up the Belgic confeſſion of faith, which was intended to preſerve the profeſſors of the reformed religion in Holland within the pale of Calviniſm. He died at Geneva in 1652, much regretted by the country and communion for which he renounced his family expectations, and the religion of his anceſtors. He was an elaborate writer, but his principal work was a tranſlation of the whole Bible into the Italian language. He publiſhed alſo a complete French tranſlation of the Bible, and a tranſlation of "Father Paul's Hiſtory of the Council of Trent;" and various other works. Moreri.

DIODIA, in *Botany*, (from Διοδος, a paſſing from one place to another, in alluſion, as Linnæus informs us, to its growing by way-ſides.) Linn. Gen. 51. Schreb. 67. Willd. Sp. Pl. v. 1. 580. Juſſ. 197. Gærtn. t. 25. Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of two or three ſomewhat ovate, undivided, permanent leaves. *Cor.* of one petal, funnel-ſhaped; tube long and ſlender; limb ſmall, in four deep, ſpreading, lanceolate ſegments. *Stam.* Filaments four, briſtle-ſhaped, erect; anthers verſatile. *Piſt* Germen inferior, roundiſh, with four angles; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma cloven. *Peric.* Capſule ovate, with four angles, crowned with the enlarged calyx, of two cells and two valves. *Seeds* ſolitary, ovate-oblong, poliſhed, convex, and furrowed on the outſide, flat on the inner.

Eſſ. Ch. Calyx two or three-leaved. Corolla of one petal, funnel-ſhaped. Capſules of two cells. Seeds ſolitary.

D. *virginiana.* Linn. Sp. Pl. 151. Jacq. Ic. Rar. v. 1. t. 29, is the only ſpecies which was known to Linnæus, or of which any figure exiſts. It was found by Clayton in Virginia, growing in watery places, and has not yet been cultivated in the gardens of Britain. Jacquin had it at Vienna, growing in the open air, but more vigorouſly in the ſtove, flowering from June to October, and ripening ſeed. It has no pretenſions to be reckoned an ornamental plant. The *root* is perennial. *Stems* ſeveral, red, decumbent and rooting, clothed with numerous, oppoſite, lanceolate, entire *leaves*, each about two inches long, and in a cultivated ſtate, rough only at the edge. *Stipulas* connate, fringed. *Flowers* axillary, ſolitary, ſeſſile, white, ſmall, the upper ſurface of their petals rough, and the calyx, according to Jacquin, moſtly conſiſting of two larger leaves, and a ſmaller one. In a wild ſpecimen, gathered by the celebrated John Bartram in Maryland, we find the leaves very rough all over with rigid points, and the fruit clothed with prominent briſtles, with three leaves to the calyx. *Diodia ſimplex, proſtrata, ſcandens* and *ſarmentoſa*, are four Weſt Indian ſpecies, ſmaller than the foregoing in their leaves and bloſſoms, of which the three laſt are ſomewhat woody. They were all gathered by Dr. Swartz, and are deſcribed in his *Flora Indiæ Occidentalis, v.* 1. D. *verticillata*. Vahl. Symb. v. 2. 28, gathered at Santa Crux by a Mr. Pflug, ſeems to differ from the original *Diodia* chiefly in having an upright ſtem. Theſe are all the ſpecies known. The habit of the genus is ſimilar to that of the far more numerous one *Spermacoce*.

DIODON, in *Ichthyology*, a genus of Branchioſtegous fiſhes, diſtinguiſhed by having the jaws bony, extended, and undivided; aperture of the gills linear; body covered on all ſides with long ſpines, which are ſtrong, and moveable, varied with white and black, hollow within, and covered with the common ſkin; no ventral fins. There are only five ſpecies of this remarkable genus at preſent known, unleſs ſome of the ſuppoſed varieties of the ſpecies Hyſtrix ought truly to be regarded as diſtinct ſpecies, as we are inclined to ſuſpect. They are inhabitants chiefly of the American ſeas.

Species.

Hystrix. Spherical; ſpines triangular. Gmel. *Le Guara*, Bloch. *Porcupine fiſh.*

The porcupine fiſh, or, as ſometimes called, the ſea porcupine, is a ſpecies of large ſize, growing to the length of two feet. The uſual ſhape is ſpherical, but it poſſeſſes the power of inflating or contracting itſelf at pleaſure, by means of an internal ſkin, or membrane, ſituated beneath the exterior, or ſpiny covering; the colour is a pale, or whitiſh grey, the back of a deeper caſt, and blueiſh, and the whole body is marked at the baſe of each ſpine by a round black ſpot, and the fins alſo are ſpotted. This fiſh, according to father Dutertre, affords an amuſing ſpectacle when taken with the hook and line baited with a piece of crab, or other ſimilar ſubſtance; after having played round the bait for ſome time, it makes various efforts to ſeize it, and at length faſtens upon it with a ſudden ſpring; but finding itſelf ſecured, it exhibits every mark of anger, inflating its body, and elevating its ſpines to the higheſt poſſible degree, and at intervals ruſhing with unavailing impetuoſity upon the pliable line, or beating about, as if endeavouring to wound in all directions. Till having at laſt tired itſelf by ineffectual ſtruggles, it ſuddenly expels the air from its body, and becomes entirely flaccid; but, on being drawn to the ſhore, it once more revives, redoubles its rage, and again inflates its body, and in this ſtate it is allowed to remain, with length of line ſufficient to admit it to expend its ſtrength in rolling about the ſhore, as it is impoſſible to touch it without danger till after its death. This ſpecies is a native of the Indian and American ſeas, and is conſidered as a coarſe and worthleſs fiſh, though ſometimes eaten by the inhabitants of the Weſt Indian iſlands. The ſkin of this fiſh is occaſionally taken off entire, and being dried in an inflated, or diſtended ſtate, ſerves the purpoſe of a lantern, being ſuſpended by the tail, and having the lighted candle placed in the inſide of the mouth. One of the ſuppoſed varieties of the ſea porcupine is of a ſomewhat rounded form, with ſhort triangular ſpines; another is roundiſh, with the ſpines triangular at the baſe; and a third conic oblong, with the ſpines long, and a little rounded.

Atinga. Oblong; ſpines on the body round. Bloch. &c.

A ſpecies much reſembling the former, but of a more lengthened form; its general colour is grey, deeper on the back, and tinged with a caſt of pink beneath. The whole body is marked, as well as the fins, with numerous round black ſpots, as in the former ſpecies. In its manners of life, it reſembles the porcupine fiſh, but grows to ſcarcely more than half its length. The ſpecies is conſidered as poiſonous, unleſs cleaned with the greateſt care, and, according to Piſo, if the leaſt quantity of the gall ſhould happen to fall on, and mix with the fleſh, it produces the moſt violent ſymptoms; the tongue becomes immoveable, the limbs ſtiffen, and a cold ſweat enſues, followed by certain death, unleſs the poiſon be expelled by immediate medical aid. This fiſh is a native of the American ſeas round the Cape of Good Hope.

Orbicularis. Body round and covered with ſhort ſpines. Bloch. *L'orbe Heriſſon. Diodon Atinga var β*, Linn.

This ſpecies inhabits the ſea of Jamaica, the Cape of Good Hope, and the Molucca iſles; grows to the length of nine or ten inches, and feeds on ſhells and cruſtaceous animals. In point of ſhape this ſpecies is almoſt ſpherical; the ſpines ſtrong, and ſhort, with the baſes broad, and ſomewhat reticulating the ſkin; the colour is rufous above, beneath paler. This, like the former, is eſteemed poiſonous.

Plumieri. Elongated, blueiſh, with white ſpots, and contracted neck. *Diodon Plumieri*, Cepede.

Reſembles the oblong diodon, but is longer in proportion, and has a conſiderable contraction behind the head; the general colour is blueiſh, with numerous ſmall round white ſpots. This ſpecies is a native of the American ſeas in warm latitudes, where it was diſcovered by father Plumier.

Liturosus. Browniſh, beneath whitiſh, and marked on the upper part with black patches. Shaw. *Dindon tacheté*, Cepede.

This is a native of the Indian ſeas, and is deſcribed by Commerſon. Its ſhape is rather globular, the colour brown above, beneath whitiſh, with a large lunate black ſpot on the nape, the horns of which point towards the eyes. On each ſide the body a ſomewhat oval patch, ſituated above the pectoral fin, and two others placed tranſverſely, the firſt beneath the eye, the ſecond between the eye and pectoral fin: throat marked by a duſky cloud, and on the back a round ſpot encircling the dorſal fin; ſpines white with brown tips, and conſiderably longer on the back than towards the abdomen. All the fins are greeniſh.

The diodon mola of Gmelin is referred to the tetrodon genus. See Tetrodon *Mola*.

DIODORI Insula, in *Ancient Geography*, an iſland of Ethiopia, in the Arabic gulf, near Egypt, according to Pliny and Ptolemy.

DIODORIDA, a town of Aſia, in Meſopotamia.

DIODORUS, in *Biography*, a diſciple of the Megaric ſchool, was a native of Caria, and a great adept in that kind of verbal combat which prevailed among perſons of his ſect. It is ſaid that a queſtion was propoſed to him in the preſence of Ptolemy Soter, by Stilpo, one of his fraternity, which he required *time* to anſwer; and on this account he was ridiculed by Ptolemy, and denominated *Chronus*. Mortified at this defeat, he wrote a book on the queſtion, and, nevertheleſs, died of vexation. He is the reputed author of the famous argument or ſophiſm againſt motion: if any body be moved, it is moved either in the place where it is, or in a place where it is not, for nothing can act or ſuffer where it is not; and, therefore, there is no ſuch thing as motion. Diodorus was ſuitably recompenſed for the invention of this ſophiſm. Having diſlocated his ſhoulder, the ſurgeon, who was ſent for, kept him for ſome time in torture, whilſt he proved, from his own mode of reaſoning, that the bone could not have *moved* out of its place. He has been improperly reckoned among the atomic philoſophers. Brucker's Hiſt. Phil. by Enf. vol. i.

Diodorus, a Peripatetic philoſopher, with whom the uninterrupted ſucceſſion of the Peripatetic ſchool terminated.

Diodorus, named *Siculus*, an ancient hiſtorian, who flouriſhed in the times of Julius and Auguſtus Cæſar, was a native of Agyrium in Sicily. He devoted himſelf to the compoſition of hiſtory, and ſpent thirty years in his ſtudies and enquiries, travelling to the very places in Europe and Aſia, which had been the theatre of important tranſactions, and inveſtigating the facts with the greateſt care and attention. A ſmall part of his labours has come down to our times. His great work was entitled Βιβλιοθηκη ἱστορικη, or "The Hiſtoric Library," in forty books on Univerſal Hiſtory, of which only fifteen and ſome fragments remain. This hiſtory was divided into the periods before the Trojan war, and from that to the death of Alexander, and thence to the commencement of Cæſar's wars in Gaul. His ſtyle is commended by Photius, as being that kind of middle diction which is ſuitable to hiſtory; but others have not thought ſo favourably of it. He has been charged with chronological errors, fable, and trivial narrative; but the fabulous hiſtory of the early ages has been alleged as an apology. Upon the whole, his hiſtory is valuable, and we have to regret the loſs of his laſt books. The beſt editions of this work are thoſe by Stephanus, Par. 1559; of Rhodomannus, Hanau, 1604; and of Weſſelingius, in two vols. fol. Amſterd. 1746.

Diodorus, deſcended from a good family, was probably born at Antioch, in which city he long reſided, and was ordained biſhop of Tarſus, in Cilicia, about the year 378. He died in 394, or ſooner. Whilſt he was preſbyter, he had the direction of a ſchool in or near Antioch, where he inſtructed young perſons in the knowledge of the Scriptures, and the principles of religion. The moſt eminent of his diſciples were Maximus, biſhop of Sileucia, in Iſauria, Theodore, biſhop of Mopſueſtia, in Cilicia, and John Chryſoſtom, biſhop of Conſtantinople, the latter of whom calls him, in one of his orations, his father. He was a firm adherent to the orthodox cauſe under the perſecutions of the Arians, and conducted himſelf with ſo much prudence, that he ſeems to have enjoyed a peaceable epiſcopate till his death. In the firſt council of Conſtantinople he was held in ſuch reſpect, as to be appointed one of the biſhops, to whoſe ſuperintendance the eaſtern churches were entruſted. His works were numerous, and conſiſted of apologies for the Chriſtian religion, controverſial treatiſes againſt the Manichees, &c. and principally commentaries on almoſt all the books of the Old Teſtament, and ſome of the New, which were deſtroyed, as ſome ſay, by the Arians, and, according to others, by the Athanaſians. Some fragments ſtill remain, which are found in the Catena Patrum Græcorum. The loſs of his writings is the more to be deplored, as they diſplayed great learning, the mode of interpreting Scripture by adhering to the literal ſenſe, and an acquaintance with Origen's Hexapla. Diodorus is much commended by Theodoret, Baſil, and other fathers of the church. Suidas has given a catalogue of his works, extracted from the fragments of Theodore. Cave's H. L. vol. i. ad Sæc. Arian. Lardner's Cred. vol. iii.

DIODURUM, in *Ancient Geography*, a place of Gaul, ſituated, according to the Itinerary of Antonine, between Durocaſſes (Dreux) and Lutetia, and ſuppoſed by D'Anville to be Jouare, near Pontchartrain.

DIOECESIS, Διοικησις, among the Romans, a prefecture

of feveral provinces joined together, under the fame governor, called præfectus. See PREFECT and DIOCESE.

DIOECIA, in *Botany*, (from δις, *double*, and οικια, *a houfe*,) the 22d clafs of the fexual, or artificial fyftem of Linnæus, containing fuch plants as have barren, or male, flowers on one individual, and fertile, or female, ones on another of the fame fpecies. Such flowers are termed dioecious; (fee DIOICI, FLORES.) This clafs is ftrictly natural and invariable only when the two kinds of flowers differ in other parts of their ftructure, befides their effential difference in the organs of impregnation, as in the Hop, *Humulus Lupulus*, becaufe fuch flowers can never vary fo as to become united. A fimilar difference of ftructure, however, in the acceffory parts of the bloffoms, is much more prevalent in the clafs *Monoecia*, whofe barren and fertile flowers grow on the fame plant, like the Oak, the Hafel, the Walnut, &c., than in the *Dioecia*. See Sm. Introd. to Botany, 470.

The Orders of this clafs are reckoned but eight in the work laft cited, though Linnæus makes them much more numerous. They are diftinguifhed by the number or connection of the ftamens, and are called, 1. *Monandria*, 2. *Diandria*, (of which *Salix*, the Willow, is an example,) 3. *Triandria*, 4. *Tetrandria*, 5. *Pentandria*, (containing the Hop, Hemp, Piftacia-nut, and fome others,) 6. *Hexandria*, 7. *Polyandria*, (comprifing all dioecious plants with eight or more ftamens,) and 8. *Monadelphia*, in which the filaments are united; of this laft the Fir, Yew, and Juniper, are inftances. S.

DIOGENES, in *Biography*, a famous philofopher of the Cynic fect, was born in the 3d year of the 91ft Olympiad, B. C. 414, at Sinope, a city of Pontus. His father was a banker, who, being convicted of debafing the public coin, was obliged to leave his country. This circumftance occafioned the removal of his fon to Athens, where he offered himfelf as a pupil to Antifthenes, who, being in a peevifh humour, refufed to admit him. As he ftill perfifted in his application, the furly philofopher lifted up his ftaff to repulfe him, upon which young Diogenes faid; "Beat me if you pleafe; I will be your fcholar." Antifthenes, at length, received him; and he became his intimate companion and friend. Having thus chofen his mafter, he adopted his principles, and refembled him in character: determining to diftinguifh himfelf by a contempt of riches and honours, and by his indignation againft luxury. He wore a coarfe cloak; carried a wallet and a ftaff; made the porticoe, and other public places, his habitation; and depended upon cafual contributions for his daily bread. Difappointed in obtaining a cell as foon as he expected, he is faid to have taken up his abode in a tub, or large open veffel, in the "Metroum." This tub, which was probably not a fettled refidence, but a temporary expreffion of indignation and contempt, is celebrated by Juvenal, (Sat. xiv. v. 308.)

" —— Dolia nudi, &c."

" Safe in his tub, the naked Cynic lives
Fearlefs of fire: break up his houfe; next day
Brings him a new one, or repairs the old."

This tub is ridiculed by Lucian (De Scrib. Hift.) and mentioned by Seneca (Ep. 90.); but no notice is taken of this circumftance by other ancient writers who have mentioned this philofopher; not even by Epictetus, who (Ap. Arr. l. iii. Diff. 24.) relates feveral particulars of his life. Whether this piece of hiftory be true or not, there is no doubt of his having practifed the moft hardy felf-controul, and the moft rigid abftinence, and of his having depended upon charity for his fcanty fupport. In conformity to the principles which he had adopted, and the character he fuftained, he reprehended the Athenians, and efpecially thofe of the higher ranks, with great freedom and fternnefs. His reproofs, however, though very pungent, manifefted fo much ingenuity, as to excite even the admiration of thofe againft whom they were directed. He uniformly inculcated patience of labour and pain, frugality, temperance, and an entire contempt of pleafure. But though his rigid difcipline procured for him from fome refpect and admiration, it fubjected him to contempt and indignity from others. But to one and the other he appeared equally indifferent, and preferved on all occafions a perfect felf-command.

Diogenes, in his old age, is faid to have failed to the ifland of Ægina; and having met with pirates, he was carried into Crete, and expofed to public fale. Being afked what he could do? he replied, "I can govern men, and therefore fell me to one who wants a mafter:" Xeniades, a wealthy Corinthian, being ftruck by this fingular reply, purchafed him; upon which Diogenes told him, "I fhall be more ufeful to you as your phyfician, than as your flave." Upon their arrival at Corinth, Xeniades gave him his liberty, and committed to his direction the education of his children, and the management of his domeftic concerns. Xeniades had fo much reafon to be fatisfied with his judgment and fidelity, that he ufed to fay, the gods had fent a good genius to his houfe. He accuftomed his pupils to the difcipline of the Cynic fect, and took greater pains to inure them to habits of felf-command, than to inftruct them in the elements of fcience. However, he was not negligent in teaching them leffons of moral wifdom, which he inculcated by fententious maxims: and he allowed them the moderate ufe of athletic exercifes and hunting. The young men, pleafed with their preceptor, treated him with refpect, and recommended him to their parents. During his refidence at Corinth, he frequently attended the affemblies of the people at the Craneum, a place in its vicinity, and at the Ifthmian games. Here he appeared under the character of a cenfor, feverely lafhing the follies of the times, and inculcating rigid leffons of fobriety and virtue. At one of thefe affemblies the conference between Alexander the Great and Diogenes is faid to have happened. Plutarch relates the ftory thus: Alexander received the congratulations of all ranks on his being appointed, after the death of his father, to the command of the Grecian army in their projected expedition againft the Perfians. Diogenes was abfent on this occafion, and Alexander expreffed his furprife at this circumftance. Wifhing to gratify his curiofity by the fight of fuch a philofopher as Diogenes, he vifited the Craneum, where he found the philofopher fitting in his tub in the fun. The king came up to him in the crowd, and faid, "I am Alexander the Great;" to which Diogenes replied, in a furly tone, "and I am Diogenes the Cynic." Alexander, requefting to know if he could render him any fervice, received for anfwer, "Yes," fays he, "do not ftand between me and the fun." Alexander, furprifed at the magnanimity of this reply, faid to his friends, "If I were not Alexander, I would be Diogenes." There are feveral circumftances in this narrative, which fuggeft fome doubts as to its truth; but it is not improbable that Diogenes, who, at the beginning of the 111th Olympiad, when Alexander held the general affembly of the Greeks, was upwards of 70 years old, might often appear in the public walks of Corinth, and that Alexander, indulging a curiofity to fee a man of his fingular character, might put himfelf in his way: nor is it unlikely, that the furly Cynic might manifeft his contempt for kings, by treating him with fome kind of rudenefs, fimilar to what has been above related.

As far as we can depend on the reprefentations of the ancients,

cients, Diogenes was a philofopher of a penetrating genius, not unacquainted with learning, and deeply verfed in the knowledge of mankind. He alfo poffeffed an elevated mind, fuperior to the viciffitudes of fortune, patient of fuffering, and incapable of fear. Contented with a little, he defpifed the luxuries of the age. Earneftly defirous of correcting and improving the public manners, he cenfured reigning follies and vices with a fteady confidence, fometimes degenerating into feverity. His freedom gave great offence to multitudes; and, of courfe, he fuffered much obloquy, and was made the fubject of ludicrous and difgraceful calumny. But we can hardly believe that a perfon, who has been extolled by fome of the moft eminent philofophers for his fobriety and virtue, and reprefented as one endowed with divine wifdom, fhould have been capable of committing the groffeft indecencies, fome of which have been charged upon him. The ftory of his intercourfe with Lais, the celebrated courtezan, is inconfiftent with chronology; and as it chiefly depends on the teftimony of Athenæus, we ought to recollect, that this writer has amaffed a variety of tales to the difcredit of philofophy. From the charge of philofophical pride, however, the moft partial advocates of Diogenes cannot acquit him: hence, he was led to treat other philofophers, and even magiftrates and princes, with contempt; and he reproved vice, wherever he found it, with bitternefs, and even with fcurrility. True wifdom cannot juftify this conduct, nor did it require his taking the cloak and wallet of a mendicant. The time and manner of his death are not fatisfactorily afcertained. It is moft probable that he died at Corinth of mere decay, in the 90th year of his age, in the 1ft year of the 114th olympiad, B. C. 324. He was buried honourably by the Athenians at the public expence; a column of Parian marble, terminated by the figure of a dog, was placed over his tomb; and his friends erected many brazen ftatues to his memory.

The philofophy of Diogenes, which was practical, confifts of the following heads:—"Virtue of mind, as well as ftrength of body, is to be acquired chiefly by exercife and habit. Nothing can be accomplifhed without labour, and every thing with it. Even the contempt of pleafure may, by habit, become pleafant. All things belong to wife men, to whom the gods are friends. The ranks of fociety originate from the vices and follies of mankind, and are, therefore, to be defpifed. Laws are neceffary in civilized ftates; but the happieft condition of human life is that which approaches the neareft to a ftate of nature, in which all are equal, and virtue is the only ground of diftinction. The end of philofophy is to fubdue the paffions, and prepare men for every condition of life."

The following maxims or apothegms of Diogenes, felected from a variety of others, may be gratifying to the reader:—"I trample under foot the pride of Plato," faid Diogenes, treading upon his robe. "Yes," faid Plato, "with greater pride of your own." To a friend, who advifed him to indulge himfelf in his old age, he faid, "Would you have me quit the race when I have almoft reached the goal." Plato, having defined man a two-legged animal without wings, Diogenes plucked off the feathers from a cock, and turning him into the academy, exclaimed, "See Plato's man." In reply to one who afked him at what time he ought to dine, he faid, "If you are a rich man, when you will; if you are poor, when you can." "How happy," faid one, "is Callifthenes in living with Alexander." "No," faid Diogenes, "he is not happy; for he muft dine and fup when Alexander pleafes." Plato, difcourfing concerning ideas, fpoke of the abftract idea of a table and a cup. Diogenes faid, "I fee the table and the cup, but not the idea of the table and the cup." Plato replied, "No wonder, for you have eyes but no intellect." His anfwer to an invitation from Craterus to come and dine with him was, "I had rather lick falt at Athens, than fit down to the richeft feaft with Craterus." Being afked what countryman he was, he replied, "A citizen of the world." To one that reviled him he faid, "No one will believe you when you fpeak ill of me, any more than they would believe me if I were to fpeak well of you." Hearing one of his friends lamenting that he fhould not die in his own country, he faid, "Be not uneafy, from every place there is a paffage to the regions below." "Would you be revenged upon your enemy," faid Diogenes, "be virtuous, that he may have nothing to fay againft you." Laertius, l. vi. § 20, &c. Arrian Epict. l. iii. Diff. 21. Brucker's Hift. Phil. by Enf. vol. i.

Diogenes (not the Cynic), the ancient Greek writer on mufic, attacked by the αμυστος, Philodemus, whofe abufe of mufic has been recovered from the cinders of Herculaneum.

Diogenes, furnamed the Babylonian, from his birthplace, Seleucia, near Babylon, flourifhed in the fecond century, B.C. He was the difciple of Chryfippus, and the fucceffor of Zeno of Tarfus, where he taught the principles of his fect with unwearied diligence, and a high reputation. He was the author of feveral works on divination, the laws, learning, &c. which have been referred to with refpect by Cicero and others. He is faid to have lived to the age of 88 years, and philofophized to the laft. That he was highly efteemed by his contemporaries is evident from his being appointed in conjunction with Carneades, the head of the academics, and Critolaus, the chief of the peripatetic fchool, to the embaffy to Rome. As a proof how well his practice conformed to his principles, we are told, that when he was once difcourfing againft anger, an infolent young man, with the hope of expofing him to the ridicule of his audience, fpat upon him, and otherwife contumelioufly treated him, upon which the philofopher obferved with meeknefs, "I am not angry, but I am doubtful whether I ought to be fo." Bayle. Brucker by Enfield.

Diogenes Laertius, fo named from the fuppofed place of his birth, Laerta, or Laertes, in Cilicia, was a Greek biographical writer; who is fuppofed to have flourifhed according to Voffius about the time of the Antonines, or fomewhat later. Others, however, have thought it more probable that he lived under Severus and his fucceffors, and that his book of the "Lives," &c. was written about the year 210, in which opinion Dr. Lardner acquiefces. As an author the principal work of Diogenes is entitled "The Lives, Opinions, and Apothegms, of celebrated Philofophers," in ten books, which has been regarded by fome as a very valuable repofitory of materials, for the hiftory of philofophy; but the character given of it by Brucker is, that the author "has collected from the ancients with little judgment, patched together contradictory accounts, relied upon doubtful authorities, admitted as facts, many tales which were produced in the fchools of the fophifts, and has been inattentive to methodical arrangement." The work appears, upon the whole, to have been the production of a credulous and feeble mind. He alfo compofed a book of epigrams, to which he refers. Little of his hiftory is known, but he is fuppofed to have been inclined to the Epicurean philofophy. His Life of Epimenides contains a paffage which ferves to illuftrate the infcription on the altar at Athens, To the unknown God, mentioned Acts, xxvii. 16—23. See Altar. The beft edition of his "Lives, &c. is that of Meibomius, Amft. 1692, 2 vols. 4to. with the obfervations of Menage. Brucker's Hift. Philos. by Enfield.

Diogenes Apolloniates, a native of Crete, and a philosopher of the Ionic fect, flourifhed about the 17th Olympiad, or 500 years B. C. Having ftudied under Anaximenes, he fucceeded Anaxagoras at Athens, where he taught philofophy and eloquence for fome time with great reputation. Either his doctrines were unpopular, or his fuccefs created jealoufy, and he was obliged to leave the city at the peril of his life; and from this period nothing more is recorded of him. Little is known of the peculiarity of his fentiments, but he appears to have held, that the air poffeffed a divine intelligence, and is the firft principle in nature: that the number of worlds is infinite, and that they were formed by an exertion of the powers of rarefaction and condenfation; and that the centre of the earth, which is globular, is in the centre of the whole. Moreri. Brucker by Enfield.

DIOGENIS Promontorium, in *Ancient Geography*, a montory of Ethiopia, upon the Arabic gulf. Ptol.

DIOGNETUS, in *Biography*, a philofopher, who flourifhed in the reign of the emperor Marcus Aurelius, and who was one of the preceptors of that prince, by whom he was inftructed in philofophy, and other branches of important knowledge. He is mentioned with great refpect by Juftin, in whofe works, publifhed by Henry Stephens in 1592, an epiftle to Diognetus is inferted. By Lardner, and other judicious critics, the claim of this epiftle to authenticity has been doubted. Diognetus was highly refpected by his contemporaries, as well as greatly beloved by his pupil, Marcus Aurelius. Lardner.

DIOICI, flores, dioecious flowers, in *Botany*, have ftamens in one individual, and piftils in another, on feparate plants of the fame fpecies. Sometimes this is accompanied with no difference in the other parts of fuch flowers, as the calyx or corolla, and therefore the organs of impregnation are liable to meet in the fame flower in other plants of the fame natural genus, as happens in *Lychnis*, *Valeriana*, *Urtica*, *Rumex*, &c. They ftill more frequently meet in flowers of the fame fpecies, that are partly monoecious or dioecious, witnefs many exotic trees, and numerous graffes, referred by Linnæus on that account to his 23d clafs, *Polygamia*, as well as our Englifh Maple, Sycamore and Afh. Hence, fuch plants have been removed in the *Flora Britannica* to the united claffes, and no genera left in *Polygamia* that have not a difference of ftructure in the acceffory parts of their flowers. This has been approved by all fcientific botanifts who have fubfequently confidered the matter. When flowers are perfectly monoecious or dioecious, and fuch diftinctions are accompanied by a difference in their acceffory parts, as in *Zannichellia*, *Carex*, *Valifneria*, and fome others, efpecially when there is moreover a difference of inflorefcence, as in *Quercus*, *Corylus*, *Humulus*, &c. nothing can be more natural, conftant, or convenient, than fuch a character. It is far otherwife when the male and female flowers are fo much alike, that there are rudiments of each part in the contrary flower. Thus, *Rhodiola* is merely a *Sedum*, with ineffectual ftamens on one plant, and abortive piftols on another. See Diclinia. S.

DIOKO-WAR, or Diacovar, in *Geography*, a town of Sclavonia; 16 miles S.W. of Efzek.

DIOMEDÆ, Insulæ, in *Ancient Geography*, iflands of the Adriatic fea, according to Strabo, Ptolemy, and Pliny. They are now the iflands of "Tremiti." One of thefe iflands was called *Teutria*, and the other *Diomedea* and *Trimetus*. They had to the fouth that part of Italy in which was fituated mount Garganus.

DIOMEDEA, in *Ornithology*, a genus of the aquatic or marine kind, the albatrofs of Englifh navigators. Thefe birds have the bill ftraight, with the upper mandible hooked at the point, and the lower truncated; the noftrils oval, wide, prominent, and lateral; tongue very fmall; and feet three-toed, all placed forward.

Species.

Exulans. White, back and wings lineated with white; bill pale yellow, legs flefh colour; quill-feathers black; tail rounded and lead colour. Gmel.—*Diomedea exulans*, Linn.—*Plautus albatrus*, Klein.—*Tchaiki*, Pallas.—*Man of war bird*, Grew.—*Wandering albatrofs*, Arct. Zool.

This fort of albatrofs is larger than the fwan, meafuring from three to four feet in length; and its general expanfion between the wings, when opened and ftretched out, about ten feet. Many voyagers fpeak of them as far exceeding even thefe dimenfions. One expanding to the breadth of eleven feet feven inches, is mentioned in Parkinfon's voyage, another of twelve feet in the Bankfian MS. One in the Leverian collection is faid to have meafured thirteen feet; and if we may credit Ives, an albatrofs of this kind was fhot off the Cape of Good Hope, which expanded feventeen feet and a half. The bill of this bird is of a dirty yellow; the crown of the head pale cinereous brown, and the legs flefh colour. The young birds are faid to be brown, becoming gradually whiter as they advance towards maturity.

Albatroffes are very abundant in many parts without the tropics, both to the north and fouthward, and are in particular found in every temperate fouthern latitude as far as the polar regions have been yet explored. Forfter tells us, they are never feen in the torrid zone. They are feen in vaft flocks in Kamtfchatka, and the adjacent iflands, about the end of June, and their arrival is a fure prefage of the fhoals of fifh approaching. They are voracious birds, and often fwallow a fifh of four or five pounds weight; but as they cannot take the whole of it into their ftomach at once, they are often caught with the tail hanging out of their mouth, and in this fituation are knocked down themfelves by the natives. When caught, they defend themfelves ftoutly with the bill; their cry is harfh and difagreeable, and refembles the braying of the afs, or rather, according to Clayton, that of a trumpet, fuch as the children buy at fairs. They are known to breed in Patagonia and the Falkland iflands, and part of New Zealand bears the name of Albatrofs Point from this circumftance. The neft is made on the ground with earth, its fhape is round, ftands about a foot in height, and is indented at the top. The egg is larger than that of a goofe, of a white colour, with a few dull fpots at the broadeft end; thefe eggs are efteemed good for eating, but poffefs this remarkable peculiarity, that the white never becomes hard by boiling.

While the female is fitting, the male is conftantly on the wing, and fupplies her with food; and during this time they are fo tame, as to fuffer themfelves to be pufhed off the neft while their eggs are taken out. But their chief deftruction arifes from the perfecution of the New Zealand falcon, which the moment the female gets off the neft, darts upon it, and flies away with the eggs. The albatrofs itfelf has its enemies likewife, particularly a fort of gull of a dark colour, like the fkua. This wily antagonift, aware of his inferiority of ftrength, endeavours to attack the albatrofs underneath, and to prevent which, the latter is obliged to fettle on the water. Thefe birds are often taken by the natives of Kamtfchatka, by means of a hook baited with a fifh: they are caught chiefly for the fake of their inteftines, a particular part of which is blown up as a bladder, and ferves as floats to buoy up their nets in fifhing. Of the bones they make tobacco pipes, needle cafes, and other ufeful things; the flefh is not in much requeft, being hard and unfavoury. Hawkefworth, however

however, mentions that they were eaten by our voyagers: as soon as caught, they were skinned, and soaked in salt water till next morning; then parboiled, and the liquor being thrown away, stewed with fresh water till tender, and being served up with savoury sauce, they were much commended. The albatross feeds chiefly on marine animals.

Two varieties of the species *exulans* are described in the Gmelinian Systema, one of which is brown, with the upper part blackish; the bill red, with the tip blackish, down cinereous, and whitish towards the head. The other is white; the region of the shoulders, wings, and tail, blackish brown; head, and upper part of the neck, deep straw colour; and the upper mandible white or reddish, the lower red, with a white keel.

Spadicea. Deep chesnut, front, orbits, chin, throat, lower quill-feathers, abdomen, and legs white; bill ochraceous white. *Diomedea spadicea*, Gmel. *Chocolate albatross*, Cook's Voyage.

This is smaller than the foregoing, measuring little more than three feet in length. The plumage is, in general, of a fine deep chocolate, palest beneath; the tail is short and rounded, and the legs bluish white, with white claws. This varies in having more or less white about the head, and inhabits the South seas. A kind of albatross, entirely of a grey brown colour, with the bill and legs pale, is found in China, and has been considered as a variety of this species: its length is two inches and a half.

Chlororhynchos. White; bill black; keel of the upper mandible and base of the lower yellow; body above black blue, beneath white. Gmel. *Yellow nosed albatross*. Lath.

Length about three feet and breadth seven, the bill black, with the upper ridge and tip yellow, and the base of the under mandible is also yellow. The head is grey, and between the bill and eyes is an obscure black spot, and another over the eye. The hind part of the neck is dusky, the lower part white; back, scapulars, and wings dusky blue black; rump and under part of the body white; the tail dusky; the legs pale yellowish white, with the fore part and webs dusky. This species is met with in the southern hemisphere from 30 to 60 degrees round the pole. This bird is observed to fly about five or six feet above the surface of the water.

Fuliginosa. Brown; head, bill, tail, quill-feathers and claws, sooty brown; area of the eyes white. Gmel. *Sooty or brown albatross*, Forster. *Albatross with a white eyebrow*, Cook's Voyage.

Inhabits the seas within the Antartic circle, is about the size of a goose, and measures about three feet in length. The bill is black; the irides pale yellow; at each angle of the eye a nictitating membrane. The general colour of the plumage is brown; the head and tail inclining to black or soot colour; for a small space above, behind and beneath the eye, the feathers are white, but not on the fore part of it; the quills and tail are dark brown, nearly black; the shafts of both white, and the latter pointed; legs pale brownish lead colour; claws black.

Observed throughout the southern ocean within the Antartic circle.

DIOMEDES, in *Biography*, was son of Tydeus, king of Etolia, and afterwards king of Argos himself. He led his subjects to Troy in numbers sufficient to man eighty ships; hence he became one of the principal commanders at the Trojan war, and Homer has made him one of the most distinguished heroes of his Iliad. After the destruction of Troy he returned to Argos, where he is said to have found his wife connected with an adulterer, and plotting with him against the life of her husband. He therefore embarked again, and after much travelling, settled with the companions of his fortunes at Daunia, on the Adriatic coast of Italy, where he married the daughter of the king, and founded the city of Argyrippa, afterwards called Arpi. Gen. Biog.

Diomedes, in *Geography*, the name of an island near the promontory of Siberia, on the N. E. point of the continent.

DIOMEDIA, in *Ancient Geography*, a town of Italy, in the Daunian district, mentioned by Virgil.

DIOMEDIS Insula, an island of Italy, at the bottom of the gulf which lies to the east of Aquileia. It is now called *Belforte*.

Diomedis *Stabulum*, a town of Thrace, which belonged to king Diomedes, called by Mela "Diomedis Turris."

Diomedis *Avis*, in *Ornithology*, the name of a bird of the web footed kind, with a slender beak, hooked at the end, and with its hinder toe not connected by the membrane that joins the rest. It is of the size of a common hen, but its neck and legs are much longer; its colour is a dusky, and somewhat greyish brown, and under the belly there is more or less white; its beak is of a fine red, or in some of a yellowish colour, with a black end. It is found in the Insula Diomedea, now called Tremiti, in the Adriatic sea, and is said to be peculiar to that place. See Shear-*Water*.

DION, in *Biography*, an illustrious inhabitant of Syracuse, who, deriving an ample inheritance from his father, Hipparinus, became a disciple of Plato, invited by Dionysius the Elder to his court at Syracuse. The philosopher was highly pleased with his scholar, and speaks in high terms of his attention and proficiency. Being a philosopher in practice, as well as speculation, Dion escaped the dissoluteness of the licentious capital, attached himself to the cause of liberty, and took part with his preceptor in the persecutions which he underwent from the tyrant. He was nearly connected with Dionysius by having married his daughter, and by his sister's being one of his wives; and he was also much esteemed by him, so as to be employed in several important embassies. At the accession of Dionysius the Younger, B. C. 366, he maintained considerable influence by virtue of his character and his wealth. At his request, Plato was again invited to the Syracusan court; and, in order to counteract his authority, the courtiers obtained the recal of Philistus, a man notorious for his adherence to arbitrary principles. This faction determined to supplant the credit of Dion and his favourite philosopher; and availed themselves of a real or suppositititious letter, to fix upon him the charge of treason. Dion, precluded from self-defence, was transported to Italy; and from thence proceeded to Greece, where he was received with great honour. At Athens he attended the academy, and the Lacedæmonians conferred upon him the freedom of their state. At length Dionysius became jealous of his popularity, stopped his remittance, confiscated his estates, and compelled his wife, who had been left at Syracuse as an hostage, to marry another person. Dion, justly incensed at this usage, determined to expel Dionysius. Plato resisted his intention; but, encouraged by other friends, he assembled a body of troops, and, with a small force, sailed for Sicily, and landed at Minoa, a town belonging to the Carthaginians. Availing himself of the absence of Dionysius upon an expedition to Italy, he advanced to the capital, and was received at the gates of the city, amidst the acclamations of the people. At length Dionysius arrived; but, after several conflicts and ineffectual proposals of accommodation, he was obliged to make his escape to Italy. Dion, possessing to a great degree the austerity and reserve of a philosopher, was supplanted

planted in the popular esteem by Heraclides, a Syracusan exile, and obliged to make his retreat to Leontium. The inhabitants of Syracuse were soon after reduced to distress by an armament sent against them by Dionysius; and a deputation was sent to Dion, imploring his assistance. The philosopher, burying in oblivion the slight he had received, and anxious only for the welfare of the state, determined to make an attempt for its deliverance. Accordingly, he marched at the head of a body of troops, who declared their readiness to follow him to death or victory, and found the city in the last extremity of desolation and terror. Having pardoned the machinations of Heraclides and his adherents, who surrendered themselves into his hands, he gained possession of the citadel, and entered it in presence of the applauding citizens. At the gate he was met by his sister, leading his son and his wife Arete. The two former were embraced by him, while the latter stood by unnoticed, and dissolved in tears. At length his tenderness was awakened, and, embracing her, he sent her with his son to his house. Having established the Syracusans in possession of their citadel, he dismissed his guards, and retired to the condition of a private citizen. As soon as public tranquillity was restored, intestine factions revived. Heraclides was among the foremost of the malcontents, and Dion was persuaded to assassinate him. This fatal deed robbed him of all mental peace, and his imagination was henceforth haunted with avenging furies. Having lost his son by a premature and voluntary death, an Athenian, who was his intimate friend, formed a conspiracy against his life. Bursting into his house, the traitor seized his person, and, whilst Dion struggled, his murderers, being unprovided with weapons, could not dispatch him, till they were supplied through a window with a dagger. The death of Dion happened about the year 354 B. C. in the 55th year of his age. His sister and wife, and a posthumous infant of which his wife was delivered, were soon after put to death. The Syracusans afterwards cherished his memory as their deliverer, and honoured him with a public monument. Plut. Vit. Dion. Rollin's Anc. Hist. vol. iv.

Dion Cassius Cocceianus, was a native of Nice, in Bithynia, and the son of Apronianus, who was prefect of Bithynia at the accession of Adrian. Dion was a senator of Rome in the reign of Commodus, and entrusted with several governments and posts of dignity under the succeeding emperors. He was twice consul; the second time as colleague to the emperor Alexander Severus, A. D. 229. His rigorous discipline, when he commanded the Pannonian legions, excited a tumult and a combination against him, which endangered his life. But he retired from Rome, and passed the greater period of his consulship in Campania. He afterwards returned to his native country, and finished his days in tranquillity. Twenty-two years of his life were devoted to the composition of a Roman history in the Greek language, comprehending, in eight books, the whole period from the origin of the Roman state to his own times. Ten years were employed in collecting materials, and twelve more in digesting and arranging them. To this work, as he informs us, he was impelled by a vision, which occurred to him the night after he had received the emperor Severus's thanks for a treatise which he had composed on the presages that had announced the elevation of that prince. This circumstance leads us to conclude, that he was not only superstitious, but inclined to adulation; and, indeed, his history is evidently partial to Cæsar and his party, whilst it abuses Cicero, Brutus, Seneca, and other patriots. His style, however, is clear and easy, and he has interspersed a variety of judicious reflections. Of the 80 books, the first 34 and part of the 35th are lost. The 25 following are extant, but the latter six in an abridged state; the last 20 are also lost, except a few fragments. We have, however, an epitome of his work from the time of Pompey to the end of it in the reign of Severus, which was made by John Xiphilinus, nephew to the patriarch of Constantinople. Dion's history, notwithstanding its defects, is justly admired, and Xiphilinus's epitome is well esteemed. In some places we find fragments of Dion himself; and the epitome often represents Dion in his own words. Dion's history is supposed to have been published soon after the year 230. In Dion's history we have a short and defective account of the siege and capture of Jerusalem, which affords a testimony to the ruin of the temple and city, and the conquest of Judæa under Titus and Vespasian. We have, likewise, in the history of Domitian, an attestation to the progress of Christianity, and the sufferings of its professors. It appears that it had got footing in the imperial family. Clement suffered death on account of it; and Domitella his wife was banished to a remote and insalubrious island, whither persons were wont to be sent for state crimes, or other like offences. Another passage in Dion's history confirms the supposition of the severity of Domitian's persecution, though it was not long, and leads us to conclude, that the persecution did not cease till after the beginning of Nerva's reign. We have also an account of the shower by which Marcus Antoninus and his army were saved in Germany. The best editions of Dion Cassius are those of Leunclavius, Hanau, fol. 1606, and of Reimarus, Hamburgh, 2 vols. fol. 1750. Crevier's Hist. Emp. vol. viii. Lardner's Works, vol. viii.

Dion, or *Dium*, in *Ancient Geography*, a promontory placed by Ptolemy in the northern part of the isle of Crete. —Also, a town of Greece, in Eubœa.—Also, a town of the Decapolis, between Pella and Gadara. Ptol.—Also, a town placed by Strabo and Herodotus in Epirus.—Also, a town of Greece, in Macedonia, situated north of mount Olympus, and near it, where the games were celebrated.—Also, a town of Italy.—Also, a town of Asia, in Pisidia.—Also, a town of Thrace, near mount Athos.—Also, a town of Asia, in Cœlosyria. Steph. Byz. says that it was near Pella, and built by Alexander. Ptolemy distinguishes Pella from Dion.

DIONÆA, in *Botany*, (a name of Venus, from her mother Dione. "*Sacra Dionææ matri, Divisque ferebam,*" says her son Æneas, Virg. Æn. 3, 19. In its botanical application, of which Solander and Ellis were the authors, it may be understood as alluding to the elegance and delicacy of the flowers which rival those of Linnæus's favourite *Trientalis*.) Venus's Fly-trap. Ellis in Act. Nov. Upsal. v. 1. 98. t. 8. Ejusd. Monogr. 38. t. 1. Linn. Mant. 2. 151. Schreb. 288. Willd. Sp. Pl. v. 2. 574. Mart. Mill. Dict. v. 2. Juss. 431. Class and order, *Decandria Monogynia*. Nat. Ord. *Gruinales*, Linn. "Uncertain," Juss. Undoubtedly a-kin to *Drosera*, and therefore to the *Capparides* of Jussieu.

Gen. Ch. *Cal.* Perianth of five ovate-oblong, acute, spreading, permanent leaves. *Cor.* Petals five, equal, obovate, concave, longer than the calyx, with numerous pellucid ribs in their lower part. *Stam.* Filaments ten, equal, awl-shaped, spreading, shorter than the petals; anthers roundish, small, their pollen three-lobed. *Pist.* Germen superior, roundish, depressed, furrowed; style thread-shaped, shorter than the filaments; stigma depressed, fringed. *Peric.* Capsule of one cell, furrowed. *Seeds* numerous, minute, nearly ovate, affixed to the "bottom of the capsule." Ellis.

Ess. Ch. Calyx of five leaves. Petals five, equal. Capsule superior, furrowed, of one cell. Seeds numerous, affixed to the base of the capsule. Stigma fringed.

The

The only known fpecies is D. *Mufcipula*, figured by Ellis in the places above cited, copied in Shaw's Nat. Mifc. t. 40. But Venten. Jardin de la Malmaifon, t. 29. and Sims in Curt. Mag. v. 20. t. 785, are original figures. It grows in the fwamps of North Carolina, lat. 35° north, and was fent in a dried ftate by John Bartram to Peter Collinfon, who, in 1765, fent the fame to Ellis. Solander communicated a fpecimen to Linnæus, from which, and Ellis's paper, the characters in the fecond *Mantiffa* were drawn up. Mr. William Young fent living plants to Kew in 1768, fince which time others have frequently been brought to England, where they bloffom one feafon in a ftove, by means of confiderable heat and moifture, but feldom furvive our winters. The great fingularity of the plant confifts in its leaves, which are radical, numerous, fpreading on the ground; obovate, each terminated by an orbicular appendage, half an inch or more in breadth when expanded, but compofed of two hemifpherical lobes, ftrongly toothed at their outer edge, coloured and glandular within. On the infide of each lobe ftand about three highly irritable erect briftles, which, when touched, caufe the two lobes to fold together like a rat-trap, imprifoning infects, no doubt that their putrifying bodies may adminifter an air wholefome to the plant, which theory, recent obfervations on *Sarracenia*, *Drofera*, and *Nepenthes* confirm. See Sm. Introd. to Botany, 195—198. The roots of the *Dionæa* are defcribed as fcaly and perennial. The flower-ftalk is folitary, radical, a fpan high, bearing a corymbus of very elegant fnow-white flowers, fomewhat refembling, in general afpect, thofe of the *Parnaffia*, the petals moreover being, like theirs, ftriped with pellucid parallel veins. Our knowledge of the fruit is imperfect, but it feems very much to accord in general ftructure with thofe of *Parnaffia* and *Drofera*, at leaft fo as to ftamp them all of the fame natural order, while other particulars approach thefe plants to *Saxifraga*, as hinted in Engl. Bot. v. 2. t. 82. The theory of botanical affinities is too much a fcience of conjecture to juftify dogmatical conclufions, and any univerfal fyftems founded upon it can as yet be but artificial and incomplete. Such attempts, however, conducted with due modefty, are laudable, and muft in the end lead to fome truths. S.

Dionæa, in *Gardening*, comprifes a plant of the low growing herbaceous perennial exotic kind; the Venus's Fly-trap, D. *mufcipula*.

It rifes in a fimple ftem to the height of about fix inches, which ends in a fpike of milk-white flowers. It has two lobes at the upper joint of the leaf, which conftitute a fort of trap, hence its name.

Method of Culture.—This is a plant which is increafed by fowing the feed obtained from its native fituation in pots of light moift mould which fhould be plunged in a moderate hot bed, and when the plants have acquired fome growth, they fhould be removed into feparate fmall deep pots filled with bog earth, dew water, and fhade, being given till they become well rooted.

The plants afterwards require to be placed in a frame or green-houfe, fo as to be protected from the full fun during the fummer heat, and have a free air, with proper waterings; but in the beginning of autumn, placed in the green-houfe, fo as to be guarded from the effects of froft being very moderately watered at that period.

Thefe are plants which are of the fenfitive kind, affording variety among others of the exotic green-houfe forts.

DIONE, in *Mythology*, a fea nymph, the daughter of Ocean and Thetis, and the mother of Venus by Jupiter.

Dione, in *Zoology*, a fpecies of Coluber.

DIONIA, in *Ancient Geography*, a town of the ifland of Cyprus.

DIONIS, Peter, in *Biography*, educated to the practice of furgery, in which he acquired confiderable fame; became firft known by being appointed reader of the lectures in anatomy and furgery in the royal gardens at Paris, inftituted by Lewis XIV. This procured him, in 1680, the appointment of furgeon in ordinary to the queen, the dauphineffes, and the royal children, which offices he held, with great credit, to the 16th of December, 1718, the time of his death. His firft publication contained the hiftory of a woman, who was fuppofed to have died in confequence of a rupture of the uterus. She was only in the fixth month of her pregnancy. On opening the body, there appeared, the author fays, to be two uteri, one of which was ruptured. But as the woman was only in the fixth month of her pregnancy, it is probable the fœtus had never reached the uterus, but was detained in one of the Fallopian tubes, which gave way, not bearing to be diftended to fuch a fize as would contain a full-grown fœtus. We have two cafes of ruptured Fallopian tubes recorded; one by De Graaf, and the other by Cyprianus: but there are no cafes of ruptured uteri occurring at fo early a period of pregnancy. This was publifhed in 1683. In 1690 he publifhed "Anatomie de l'homme, fuivant la circulation du fang, et les nouvelles decouvertes," 8vo.; an ufeful epitome, containing all that was then known on the fubject. It was well received, and frequently reprinted. It was tranflated, in 1718, into the Tartar language, by order of Cam-hi, the emperor of China, for the benefit of his fubjects. His next work, which firft appeared in 1707, was "Cours d' Operations de Chirurgie demontreé, au Jardin Royal de Paris," 8vo. This has been reprinted ftill more frequently than the former work, and has been tranflated into nearly all the modern languages. Heifter gave an edition of it in Latin, with notes, and it ftill retains a certain degree of credit. In 1709, he gave "Differtation fur la mort fubite, avec l' hiftoire d'une fille cataleptique," 12mo.; and, in 1718, "Traite general des accouchmens," 8vo. This alfo has been tranflated into moft modern languages, though it contains little more than an abridgment of the practice of Mauriceau, and is now almoft entirely unnoticed. Hall. Bib. Chir. Eloy. Dict. Hift.

DIONYSI Promontorium, or *Civitas*, in *Ancient Geography*, a promontory or town, fituated in the fouthern part of the ifland of Taprobana, according to feveral copies of Ptolemy.

DIONYSIA, an ifland of the Mediterranean fea, over-againft the coaft of Etolia.—Alfo, an ifland of the fame fea, over-againft the coaft of Lycia, in Afia Minor. Pliny fays that it was fometimes called *Caretha*.—Alfo, an epifcopal town of Afia, under the metropolis of Boftra.—Alfo, a town of Greece, in Bœotia, faid to have been built by Bacchus.—Alfo, a town of Italy.

Dionysia, or *Dionyfiaca*, folemn feafts, held among the ancients, in honour of Bacchus.

The word is formed from the Greek Διονυσια, of Διονυσος, *Bacchus*; and that of Διος, the genitive of Ζευς, *Jupiter*, and *Nyfa*, a city in Egypt, on the frontiers of Arabia, where Bacchus is faid to have been educated by the nymphs.

The Dionyfia are the fame with what are otherwife called Orgia, and by the Romans Bacchanalia and Liberalia.

There are divers feftivals under the denomination of Διονυσια, *Dionyfia*; but the chief were two; *viz.* 1. The ancient, αρχαιωτερα, probably the fame with μεγαλα, or the greater Dionyfia; fometimes alfo called, by way of eminence, Διονυσια, without any other addition, as being the moft celebrated of all Bacchus's feftivals at Athens, where it was held in the month of Elaphebolion. This feftival was celebrated by the Athenians with extraordinary magnificence; tragedies and comedies

comedies were then exhibited in the theatre; and hymns in honour of Bacchus, accompanied with flutes, were chaunted by the chorus, in the Odeum. On this occafion each of the 10 Athenian tribes appointed a choragus, whofe office is particularly defcribed under the article CHORAGUS. 2. The new, Νεωτερα, probably the fame with μικρα, or the leffer Dionyfia, held in autumn, as a fort of preparation to the greater. Some will have this the fame with Διονυσια Ληναια, fo called from Ληνος, a *wine-prefs*, and place it in the month Lenæon.

Several days of the year were dedicated to the worfhip of Bacchus. The city, the harbour of Piræus, the country, and the neighbouring towns, alternately re-echoed with his name. The whole city has on this occafion been in a ftate of complete intoxication. Bacchanals and bacchanalian nymphs, crowned with ivy, fennel, and poplar, danced and howled through the ftreets with convulfive agitations, and invoked Bacchus with barbarous acclamations. They have torn the raw entrails of the victims with their teeth and nails, fqueezed ferpents in their hands, interwove them in their hair, twifted them round their bodies, and by fuch extravagancies attracted the attention of the terrified multitude. Similar fcenes were exhibited at a feftival which was celebrated on the firft appearance of fpring. The city was then filled with ftrangers, who repaired thither in crowds, to bring the tribute of the iflands fubjected to the Athenians, to fee the new pieces prefented at the theatre, and to be prefent at the games and public fhows; but, above all, at a proceffion which reprefented the triumph of Bacchus. In this the fame retinue is exhibited with which that god is faid to have been attended when he made the conqueft of India: men, who perfonated fatyrs, others who reprefented the god Pan; fome dragging goats along to facrifice them; others mounted on affes in imitation of Silenus; others difguifed like women; others again carrying obfcene figures, fufpended on long poles, and finging the moft licentious hymns: in fine, all forts of perfons, of both fexes, moft of them clad in the fkins of fawns, concealed under mafks, crowned with ivy, either drunk or feigning to be fo, mingling their uninterrupted fhouts with the found of inftruments; fome agitating their bodies like madmen, and abandoning themfelves to all the convulfions of fury; others executing regular and military dances, but holding vafes inftead of bucklers, and throwing thyrfi, in the manner of darts, with which they fometimes menaced and infulted the fpectators. In the midft of thefe bands of furies, the choruffes deputed by the different tribes advanced in the moft perfect order; and a number of young women, of the moft diftinguifhed families of the city, walked with downcaft eyes, decked out in all their ornaments, and bearing on their heads the facred bafkets, which, befides offerings of the choiceft fruits, contained cakes of different forms, grains of falt, ivy leaves, and other myfterious fymbols.

The roofs of the houfes, which were in the form of terraces, were covered with fpectators, and efpecially women, moft of them with lamps and torches, to light the proceffion, which almoft always began its march at night, halting in the fquares and public places, to make libations, and to offer up victims in honour of Bacchus. The day was confecrated to different games. The company repaired early to the theatre, either to be prefent at the competitions in mufic and dancing between the choruffes, or to fee the new pieces, which the poets had prepared for the occafion. The firft of the nine archons prefided at thefe feftivals; the fecond at other folemnities; and both had fubordinate officers to relieve them in their functions, and alfo guards to drive all perfons from the theatre, or other fpectacles, who occafioned any difturbance. As long as thefe feftivals continued, the leaft violence done to a citizen was criminal, and no creditor was allowed to profecute his debtor. All crimes and diforders committed at this time were feverely punifhed on the fucceeding days. Anacharfis, vol. ii.

On occafions of this kind, the Heathens worfhipped with divine honour thofe parts of the body, which are the inftruments of exciting and gratifying the moft impure paffions. The figures of them, as we have obferved above, were carried about in fome of their facred proceffions, to which hymns were fung, and religious veneration paid. Concerning the obfcenities in their facred rites and ceremonies, Arnobius, who had himfelf been a learned Pagan, treats largely.(Adverf. Gent. l. v. p. 168, 169, &c. Ed. Varior. Lugd. Bat. 1651.) to which may be added what Clemens Alexandrinus relates concerning the facred cheft or coffer of Bacchus, and its impure contents, which were propofed to veneration. (Clem. Alex. Protrept. p 16. Ed. Potter.) See alfo what Auftin fays from Varro, which delicacy forbids us to tranflate. "De turpitudine facrorum quæ Libero celebrantur. In Italiæ compitis quæ dicit (Varro) facra Liberi celebrata cum tantâ licentiâ turpitudinis, ut in ejus honorem pudenda virilia colerentur. Nam hoc turpe membrum, per Liberi dies feftos cum honore magno plostellis impofitum, prius vere in compitis, et ufque in urbem poftea vectabatur. In oppido autem Lavinio Libero totus menfis tribuebatur, cujus diebus omnis verbis flagitiofiffimis uterentur, donec illud membrum per forum tranfvectum effet, atque in loco fuo quiafcerit. Cui membro inhonefto matrem familias honeftiffimam palàm coronam neceffe erat imponere." Auguftin. De Civ. Dei, l. vii. c. 21, p. 136. Ed. Bened.

DIONYSIACA, in *Antiquity*, was a defignation given to plays and all manner of fports acted on the ftage; becaufe play-houfes were dedicated to Dionyfius, *i. e.* Bacchus and Venus, as being the deities of fports and pleafure. Potter, Archæol. Grec. lib. i. cap. viii. tom. i. p. 41.

DIONYSIADES INSULÆ, in *Ancient Geography*, iflands mentioned by Diodorus Siculus, and placed by him in the vicinity of that of Candia, in the gulf *Didymus*.

DIONYSIAN, or VICTORIAN PERIOD. See CYCLE, and PERIOD.

DIONYSIANA, in *Ancient Geography*, a town of Africa, in the Bizacian territory.

DIONYSIAS, a town of Egypt, fituated near the lake Mœris.

DIONYSIAS, in *Botany*, from Διονυσος, *Bacchus*, is not only an appellation of the Ivy, facred to him, but has been given to the *Hypericum Androfæmum*, or Tutfan, by fome writers, who are generally confidered, in that inftance at leaft, as incorrect.

DIONYSII PROMONTORIUM, in *Ancient Geography*, a mountain of Spain, on the fea of Iberia, acccording to the Argonautics of Orpheus.

DIONYSIUS I. in *Biography*, king of Syracufe, was raifed to that high rank, from the ftate of fimple citizen. He was fon-in-law to Hermocrates, who, having been banifhed by an adverfe party, attempted to return by force of arms, and was killed in the action. Dionyfius was dangeroufly wounded, but he recovered, and was afterwards recalled. In time he procured himfelf to be nominated one of the generals, and under pretence of raifing a force fufficient to refift the Carthaginians, obtained a decree for recalling all the exiles. He was foon called to take the chief command. His firft act was to double the foldier's pay, and pretending that his life was in danger, he was allowed a body guard, which he took care to felect from thofe moft devoted to his fervice. His courfe was now clear; and in the 25th year of his age

age about 404 B. C. he affumed the title of king of Syracufe. His reign was not without trouble: in an expedition againft the Carthaginians, he was deferted by his own cavalry, who fled back to the city, and made themfelves mafters of the citadel and of his treafures. Apprized of their plans, he followed them with great celerity, got poffeffion of the citadel, and took a fpeedy and fevere revenge. He now made peace with the Carthaginians, and employed himfelf in fortifying the city, after which he made an expedition againft fome of the free ftates of Sicily; and in time he became mafter of the whole ifland, and then fet about expelling the Carthaginians from all their remaining poffeffions in Sicily. With this view he fpared no expence; inviting all the beft artificers from Greece and Italy, whom he treated with a liberality truly worthy of his high rank. He fitted out a great fleet and rendered himfelf very popular among his own fubjects. War was now declared againft the Carthaginians, and carried on for fome years with various fuccefs: during the conteft, Polyxenus, who had married Thefta, the fifter of Dionyfius, declared againft the king, and when he was beaten and obliged to retire, Dionyfius fent for his fifter, infifting upon her difcovering whither Polyxenus had fled. "Do you fuppofe me," faid Thefta with a noble mind, "fo bad a wife as not to have accompanied my hufband had I been aware of his departure? If I had been acquainted with his defign, I fhould have never informed you of it, but fhould have fhared all hazards with him, and have thought myfelf more honoured in being called the wife of Polyxenus the exile, than fifter of Dionyfius the tyrant." The king forgave her freedom, and the Syracufans fo much honoured her conjugal fidelity, that after the abolition of the tyranny, they continued, during her life, to treat her with all the honours of her rank, and beftowed a public funeral upon her at her deceafe. The Carthaginians were at length fo much reduced by defeats and ficknefs, that they were glad to obtain permiffion to quit the ifland. Dionyfius afterwards carried his arms into Italy, befieged and took Rhegium, and fold all his captives for flaves. His conduct towards Phyto, the commander, was worthy only of a cruel tyrant, a character which in many refpects he deferved, as well for his actions, as for the mode by which he attained the fovereignty: the fon of Phyto he caufed to be thrown into the fea, and the father he firft treated with every indignity, and then put to death. Dionyfius was not lefs ambitious of being efteemed learned, than he was of being poffeffed of the fupreme power. He wifhed to be regarded as a poet, an honour which no doubt was readily conferred upon him by fervile flatterers, but Philoxenus fpoke freely of the merit of the verfes of his royal mafter; and as a reward for his integrity, was committed to prifon. Dionyfius, however, liberated him the next day, and then inviting him to a fplendid entertainment, read fome other verfes, which he thought would not fail of the poet's approbation: in this however he was difappointed. Philoxenus, when he had heard the lines, turned to the guards, and defired them to carry him back to the prifon: the king, no doubt, mortified at the incivility which was offered him, had the moderation and good fenfe to pardon it. Dionyfius next fent his brother in his own name, and with his own productions, to contend at the Olympic games for the prize awarded to the beft written poetry; the brother, it was admitted, did his part; but the verfes were received with the utmoft ridicule: and Lyfias, the orator, pronounced an harangue, proving that it was difhonourable for Greece to fuffer an impious tyrant to fhare in the folemnities of a facred entertainment. Dionyfius, however, made a fecond attempt, and meeting with no better fuccefs, he fell into a phrenetical melancholy. He vented his firft rage on his own friends, and then attempted to divert his chagrin by a public war, which proved unfuccefsful, and he was obliged to conclude a peace on very unfavourable terms. Dionyfius, after the death of his firft wife, married two others at once, *viz.* Doris, a Locrian, and Ariftomache, the fifter of Dion: he treated them with impartiality, and had children by both. His relation Dion reproved him with moderation, and, in order to improve his mind and temper, perfuaded him to invite Plato to his court; but the difcourfes of the philofopher were ill adapted to the irritated mind of the tyrant, and he was fent back in difgrace. It is even faid that he directed the owner of the veffel to fell Plato for a flave, obferving that according to his doctrine, no injury could be done him, fince a virtuous man muft be happy in every ftate: fuch was the apology which he was willing to offer for the injuftice that he was anxious to commit. As he advanced in years, he became the moft fufpicious of tyrants: he confided in no one: the moft intimate of his wives' relations, and their neareft friends, were never permitted to enter the palace without being previoufly fearched, and the king himfelf flept in a bed chamber furrounded by a deep ditch, with a drawbridge. It is recorded of Dionyfius that he obliged the fervile courtier Damocles to partake of a fplendid feaft, while a naked fword was fufpended by a fingle hair over his head. In the year 366 B. C. a tragedy of his was acted, and to it was awarded the prize: this fo elated the king, that he offered a folemn facrifice, feafted all his fubjects, and drank himfelf fo much to excefs, as to be the caufe of his death, which happened in the thirty-eighth year of his reign. Univer. Hift.

Dionysius II. fon of the preceding, fucceeded peaceably to his authority, but he was foon plunged into the debaucheries of a court, and it required all the influence of his uncle Dion, aided by the leffons of Plato, to recal him to fobriety. He then feemed to imbibe the true principles of philofophy, and to enter fo much into their fpirit, as to confider the cares of government a curfe rather than a bleffing. The courtiers gained an afcendancy over the young king, and fucceeded in driving from his prefence Dion and Plato. The latter was exhorted to return, to which he confented, and Dionyfius received him in the moft honourable manner: their friendfhip did not long continue, and Plato again left the court, upon which Dionyfius abandoned himfelf to every fpecies of excefs and tyranny. While Dionyfius was abfent in Italy, Dion landed in Sicily, took poffeffion of Syracufe, from which the king was unable to expel him till after the affaffination of Dion, and Sicily itfelf had been the prey of different factions and tyrants. In the year 350 B.C. he re-afcended the throne, but his paft misfortunes did not produce any real effect on the mind of the monarch: the evils which he had fuffered in his own perfon from the violence of party, exafperated his temper, and rendered him more a tyrant. At length driven to retirement by Timoleon, he went to Corinth, where he kept low company, and indulged in grofs debauchery. He took upon himfelf to direct the performances of the theatre, and difplayed fome fkill in mufic. Some writers have afferted that he was obliged, for a maintenance, to open a fchool at Corinth; but this is not mentioned by Plutarch, and is probably not entitled to credit. Neither the time nor the place of his death is known. In his fallen ftate he was liable to the reproaches and farcafms of the witty: to one who afked what he had gained by the wifdom of Plato, he replied, "The ability to bear as I do this change of fortune." Plutarch. Univer. Hift.

Dionysius of Halicarnaffus, an hiftorian and critic, fon of Alexander, was a native of Halicarnaffus, in

Caria. He came to Rome B. C. 30, and paffed more than twenty years in that capital. Here he employed himfelf in ftudying the Latin language, in converfing with men of learning, and in carefully perufing the ancient Roman hiftorians. From their works he compiled his "Roman Antiquities," in which the hiftory of the city was brought down to the firft Punic war. This work originally confifted of twenty books, of which eleven only have come down to us. Dionyfius wrote alfo on rhetorical and critical fubjects, and his "Comparifons of fome Ancient Hiftorians" and "Treatife on the Structure of Language," are well known to the moderns. The ftyle of this writer is flat and languid, but he is regarded as an accurate hiftorian, and judicious in his narratives. Moreri.

Dionysius, called the *Areopagite*, from his being a member of the court of Areopagus, at Athens, was probably born in that city, and was converted to Chriftianity by St. Paul's preaching. (See Acts, xvii. 34.) His literary acquirements at Athens and at Heliopolis, in Syria, are faid to have been confiderable, and we may infer from the ftation which he occupied that his character was refpectable. Tradition reports that he was the firft bifhop of Athens, appointed to that office by the apoftle Paul; and that he was one of the early Chriftians, who fuffered martyrdom, probably under Domitian. Several works have been afcribed to Dionyfius, which were printed at Cologne in the year 1536, and which have been frequently reprinted with various commentaries. The moft complete editions are thofe of Antwerp, in 1634, and of Paris, in 1644, both in two volumes folio. It is now, however, the general opinion of learned men, that they are fpurious, though they differ in opinion concerning the time when they were written. The opinion moft generally received is, that they were written in the latter part of the fifth, or the beginning of the fixth century. James Bafnage afferts, that the author of thefe works mentions no books of the Old Teftament but thofe of the Jewifh canon; and it it is plain that one of thofe books is the Song of Songs. Daillé fays, that he omits no facred book, either of the Old or New Teftament; however "the beloved difciple" alone is exprefsly mentioned. It is manifeft, that the author received the Revelation; and it is probable, that he thought St. John's Gofpel to be the laft written book of the New Teftament, it being mentioned laft, and next after the book of Revelation. Fab. Bib. Gr. T. v. Cave's H. L. vol. i. Lardner's Works, vol. ii. iii. and v.

Dionysius, bifhop of Corinth, flourifhed under the emperors Marcus Antoninus and Commodus, about the year 170. Some have afferted, but without fufficient authority, that he was a martyr. St. Jerom reprefents him as a man of great eloquence and induftry, and he appears to have been actuated in a very eminent degree by a truly Chriftian fpirit. Defirous of extending his ufefulnefs beyond the limits of his own ecclefiaftical charge, he addreffed epiftles to Chriftian churches in different provinces of the Roman empire, with a view of confirming them in the faith, and guarding them againft noxious errors. Of thefe epiftles we have remaining only fome fragments cited by Eufebius; but thefe feem to evince the genuinenefs of the Chriftian fcriptures, and to pourtray the judgment, candour, and peaceable fpirit of the author. Cave's H. L. vol. i. Lardner's Works, vol. ii.

Dionysius, bifhop and probably native of Alexandria, fucceeded Heraclas in the chair of the catechetical fchool of that city, A.D. 231 or 232, and upon his death was chofen bifhop in his room, A.D. 247 or 248. He died in the 12th year of the emperor Gallienus, in the year of Chrift 264 or 265. Dionyfius was defcended from a Gentile family of rank and wealth; and after his converfion to the Chriftian faith, became a difciple of Origen, and was afterwards numbered among his moft diftinguifhed fcholars. The period of his epifcopate was peculiarly trying and difficult, but fuch was his prudence, that he conducted himfelf in fuch a manner as to clofe life with reputation. During this period there happened the two perfecutions of Decius and Valerian, befide a peftilence that ravaged the whole Roman empire, and other public calamities, together with fome private commotions, in which Alexandria was concerned. It was alfo at this time that the Chriftian church was agitated by the controverfies about Novatianifm, the Millennium, the baptifm of heretics, and the doctrine of the Trinity, in all which Dionyfius fignalized himfelf by his learning, zeal, moderation, and prudence. Soon after Decius's edict of perfecution, which was publifhed at Alexandria in the beginning of the year 250, Dionyfius was feized by order of Sabinus, prefect of Egypt, and committed to cuftody at Tapofyris, a fmall village in that part of Egypt called Mareotis. But being refcued from this confinement, he retired to a defert part of Libya till the termination of this perfecution, when he returned to his charge at Alexandria fome time in the year 251.

Soon after the commencement of the perfecution under Valerian and his fon Gallienus, before the end of the year 257, Dionyfius was fummoned before Emilian, then prefect of Egypt; who required him to renounce the Chriftian religion; but to this authoritative mandate the bifhop replied, without hefitation, that *we ought to obey God rather than man* (Acts, v. 29.), and affured the prefect, that he was a worfhipper of the one God, and could worfhip no other, nor could he ever ceafe to be a Chriftian. Upon which he ordered Dionyfius and his affociates to a place called Cephro, in Libya, under a ftrict prohibition that they fhould not hold any affemblies. During his exile, he retained a tender affection and concern for his people, and exercifed his miniftry among thofe who were his companions in tribulation. In this ftate of banifhment he continued about two or three years; and in the year 261, he returned to his people at Alexandria, among whom he officiated to their great fatisfaction and profit. But the peace of this city was of fhort duration; for it was again afflicted with fedition and war, and then with peftilence. In thefe diftreffing fcenes, Dionyfius exhibited an admirable example of fortitude, piety, and humility, and of zeal in promoting the edification and tranquillity of the Chriftian church. Of the numerous epiftles and treatifes which were written by him, we have remaining only one entire epiftle, and confiderable fragments of others preferved by Eufebius. In the controverfies of his time, Dionyfius feems to have taken an active part. He ftrongly oppofed the opinion of Novatian on the fubject of repentance, and the treatment of lapfed Chriftians. He was alfo adverfe to the grofs notions of the millennium, that prevailed in fome parts of Egypt; and he endeavoured to appeafe the contentions that fubfifted between Stephen bifhop of Rome, and Cyprian bifhop of Carthage; and the letters which he wrote on this occafion manifeft an excellent fpirit of candour and Chriftian charity. He wrote alfo againft the doctrine of Sabellius concerning the Trinity, and againft Paul of Samofata, whofe peculiar opinions will appear under their refpective articles. Dionyfius's own opinion, with regard to the Trinity, feems to have been much the fame with that of Arius. Eufebius's E. H. l. vi. and vii. Cave's Hift. vol. i. Fab. Bib. Græc. T. v. Lardner's Works, vol. iii.

Dionysius, pope, or bifhop of Rome, was advanced from the office of prefbyter to the epifcopal dignity in this city, July 22, A.D. 259, and died December 26th, A.D. 269.

269. About the commencement of his epifcopate, in the year of our Lord 260, or 261, the Chriftians at Cæfarea, in Cappadocia, were reduced to great diftrefs by the invafion of fome barbarous people; upon which this good bifhop wrote them a letter of fympathy and comfort, and fent fome perfons to redeem fuch of the brethren as had been taken captive. This benefit was long held in grateful remembrance at Cæfarea. Dionyfius was a writer in the Sabellian controverfy, and correfponded with his name-fake of Alexandria on this fubject. A large fragment of what he wrote on this point remains cited in a work of Athanafius. He alfo addreffed a letter to the bifhop of Alexandria upon the queftion of the baptifm of heretics. The decretal epiftles that have been afcribed to him are allowed to be fpurious, nor does any thing of his genuine writings remain befide the fragments above-mentioned. Eufebius and Bafil reprefent him as a perfon of great learning and perfonal merit. From the fragments that remain of his writings, it fufficiently appears that he concurred with other Chriftians of that time in acknowledging the divine fcriptures, contained in the Old and New Teftaments, to be the rule of faith by which all doctrines were to be tried. Eufebius's E. H. l. vii. c. 7. Cave's H. L. Lardner's Works, vol. iii.

Dionysius furnamed *Exiguus*, or the Little, on account of his fhort ftature, was a native of Scythia, flourifhed under Juftinian towards the beginning of the fixth century, and died, according to Cave, before the year 556, or, according to Blair's Tables, in the year 540. He was a monk and abbot of Rome, and an intimate friend of Caffiodorus, who extols his learning and character. This writer informs us that he was a complete mafter of the Greek and Roman languages, that he had diligently ftudied the fcriptures, and that he was eminently diftinguifhed by a combination of great wifdom, learning, and eloquence, with the moft amiable virtues. His works, recited by Cave (ubi infra) were numerous; and he is faid to have been the author of the vulgar Chriftian *epocha* (which fee), and to have invented the *Cycle* of Eafter (which alfo fee), afcribed by others to Victor, or Victorinus. Cave's H. L. vol. i. p. 513.

Dionysius, a Greek poet and mufician, author of the words and mufic of three hymns, of which the firft is addreffed to Calliope, the fecond to Apollo, and the third to Nemefis. Of thefe the mufic has been preferved and publifhed by Dr. Fell, bifhop of Oxford, in 1672. This precious manufcript, which was found in Ireland, among the papers of the famous archbifhop Ufher, was bought, after his deceafe, by Mr. Bernard, fellow of St. John's college, who communicated it to the editor, together with remarks and illuftrations by the reverend Mr. Edmund Chilmead, of Chrift-church, who likewife reduced the ancient mufical characters to thofe in common ufe. It appears by the notes, that the mufic of thefe hymns was compofed in the Lydian mode, and diatonic genus.

Vincenzo Galilei, father of the great Galileo, firft publifhed thefe hymns, with their Greek notes, in his "Dialogues upon Ancient and Modern Mufic," printed at Florence, 1581, folio. He affures us, that he had them from a Florentine gentleman, who copied them very accurately from an ancient Greek manufcript, preferved in the library of cardinal St. Angelo, at Rome, which MS. likewife contained the treatifes of mufic by Ariftides Quintilianus, and Bryennius, fince publifhed by Meibomius and Dr. Wallis. The Florentine edition of thefe hymns entirely agrees with that printed at Oxford. In 1602, Hercules Bottrigari mentioned the fame hymns in his harmonical difcourfe, called "Melone," printed at Ferrara, in 4to. But he derived his knowledge of thefe pieces only from the Dialogues of Galilei; however, he inferted, in the beginning of his book, fome fragments of them in common notes; but they were disfigured by a number of typographical errors.

At length, in the year 1720, M. Burette publifhed thefe three hymns in the "Memoirs of the Academy des Infcriptions," tome v. from a copy found at the end of a Greek manufcript in the king of France's library at Paris, No. 3221, which likewife contained the mufical treatifes of Ariftides Quintilianus, and of Bacchius fenior. But though the words were confufed, and confounded one with another, they appeared much more complete in this manufcript than elfewhere, particularly the hymn to Apollo, which had fix verfes more at the beginning; and that to Nemefis, which, though deficient at the end in all the other editions, was here entire, having fourteen verfes, exclufive of the fix firft.

We have been the more folicitous to trace the manner in which thefe curious fragments were difcovered, in order to afford our readers all poffible fatisfaction with regard to their authenticity; indeed they have been fifted, collated, and corrected by the moft able critics in the Greek language, as well as the moft fkilful muficians of the two laft centuries. M. Burette has publifhed the mufic to thefe hymns, in the Memoirs of the Academy des Infcriptions, tome v. and Dr. Burney, in the firft volume of his "General Hiftory of Mufic," has had this mufic engraved both in ancient and modern notation.

Dionysius *Halicarnaffenfis*, junior, flourifhed, according to Suidas, under the emperor Adrian, and wrote twenty-fix books of the "Hiftory of Muficians," in which he celebrated not only the great performers on the flute and cithara, but thofe who had rifen to eminence by every fpecies of poetry. He was, likewife, author of five books, written in defence of mufic, and chiefly in refutation of what is alleged againft it in Plato's Republic. Ariftides Quintilianus has alfo endeavoured to foften the feverity of fome animadverfions againft mufic in the writings of Cicero; but though time has fpared the defence of this author, yet it does not indemnify us for the lofs of that which Dionyfius junior left behind him; as teftimonies are ftill remaining of his having been a much more able writer than Arift. Quintilianus.

The lofs of the entire works of this writer is feverely felt by all mufical hiftorians, but particularly by thofe who feek information concerning the mufic and muficians of the ancient Greeks.

Dionysius, *Ear of*, in *Geography*, a large cavern in the ifland of Sicily, cut horizontally into a rock, 72 feet high, 27 broad, and 219 in depth; the entrance of which refembles the fhape of an ear, and the infide fomewhat the form of the letter S. On the top of the cave there is a groove, which runs from one end to the other, and has communication with a fmall room at the entrance, now inacceffible, by reafon of the height and fteepnefs of the rock. This is imagined to have been a guard-room, where the tyrant placed a centinel, who, by hearing every the leaft whifper of the prifoners within, made his report accordingly to his mafter. Mr. Brydone, in his Travels, gives to the cave the exact form of the human ear, but affigns to it larger dimenfions than thofe above ftated from Sandwich's "Voyage round the Mediterranean." Some, among later travellers, deny the exiftence of any other than a rude or fancied refemblance in the cave to the ftructure of the ear, and deride the idea of fuch a defign in its original formation. Lord Sandwich fuppofes this cavern to be the "Latumiæ Syracufanæ" mentioned by Cicero; but moft other travellers agree, that the immenfe cavern, which has been converted into a fubterraneous garden, and belongs to the convent of the capuchins, was the "Latumiæ" to which Cicero alluded.

DIONYSO-

DIONYSOPOLIS, in *Ancient Geography*, a town of the Hither India, according to Ptolemy, who adds, that it was alfo called *Nagara*. Arrian places it between the Indus and the Cophenes. It was the *Nyfa* of Alexander, and the modern *Nughz*, or *Nagaz*.—Alfo, a town of Lower Mœfia, in the vicinity of the Euxine fea. Pliny fays, that it was alfo called *Crunos*; but Pomponius Mela fays, that Crunos was the name of the port of Dionyfopolis. It is faid to have had this name from a ftatue of Bacchus, which was carried by fea to this place.—Alfo, an epifcopal town of Afia, in the fecond Pacatian Phrygia; founded by Eumenes and Attalus, who found in this place a ftatue of Bacchus. Steph. Byz.

DIOPA, or Dione, a town of the Peloponnefus, in Arcadia.

DIOPHANTINE Problems, fo called from the inventor, Diophantus, a fpecies of indeterminate problems relating to fquare and cube numbers, and often admitting a variety of anfwers. The folution of them depends,

1. On affuming fuitable pofitions to denote the number fought.

2. On making the propofed expreffion a fquare.

3. Or, on making two propofed expreffions fquares, &c. called the refolving of a duplicate equality.

Thefe problems feldom involve equations of a high order; neverthelefs, it is extremely difficult to give any general rules by which their folution can, with certainty, and in all cafes, be effected.

Yet it will be found, that there are two or three very general principles, on a due application of which the folution of almoft all of them, in great meafure, depends: thefe are,

1. To refolve a *fingle equality*, or to make an expreffion a fquare, which is fully illuftrated in Prob. I. and Art. 30.

2. To find the fides of whatever right-angled triangles may be required: this is founded on Euc. 47.1, and is fully illuftrated in Prob. VII. and the following ones, and forms a tranfition to the

3d Principle. To refolve a duplicate equality, or to make two given expreffions fquares, fee Prob. XI. &c. and Art. 30, and Edingb. Tranf. vol. ii. p. 194. This is of very extenfive application, and is the foundation of the

4th Principle. To refolve two given fquares into as many other pairs of fquares as may be required, fee Prob. XX. and Art. 30. It may be diftinguifhed by the name of the variation principle, and may be folved, likewife, as follows:

Let a^2 and b^2 be the given fquares, and x^2 and y^2 the required ones. Then $a^2 + b^2 = x^2 + y^2$, or $x^2 = - a^2 b^2 - y^2$, or $\overline{x + a} \times \overline{x - a} = \overline{b + y} \times \overline{b - y}$, or $\overline{x + a} \times \overline{mx - ma} = \overline{b + y} \times \overline{mb - my}$. Now, if $x + a = mb - my$, then $\overline{mx - ma} = b + y$, or $x - a = \frac{b + y}{m}$, and $x = \frac{b + y + ma}{m}$; whence $\frac{b + y + ma}{m} = mb - my - a$, or $b + y + ma = m^2 b - m^2 y - ma$, or $m^2 y + y = m^2 b - 2ma - b$, and $y = \frac{m^2 b - 2ma - b}{m^2 + 1}$, and $x = \frac{m^2 a + 2mb - a}{m^2 + 1}$.

Cor. 1. If $b = 0$, or one fquare a^2 be to be divided into two others, we have $x = \frac{m^2 a - a}{m^2 + 1}$, and $y = \frac{-2ma}{m^2 + 1}$, or $\frac{2ma}{m^2 + 1}$, which is Prob. VIII.

Problem I.

To make a Propofed Expreffion a Square.

Rule.—Affume a fuitable fide for it, and make its fecond power equal to the propofed expreffion.

Examples.

1. Required fuch a value of n, that $n^2 + 1$ may be a fquare.

Affume $n^2 + 1 = \overline{n - z}|^2 = n^2 - 2nz + z^2$ = a fquare; then $2nz = z^2 - 1$, and $n = \frac{z^2 - 1}{2z}$, and z may be any number greater than 1.

If $z = 2$; $n = \frac{3}{4}$, and $n^2 + 1 = \frac{9}{16} + \frac{16}{16} = \frac{25}{16}$ = a fquare.

If $z = 3$, $n = \frac{8}{6}$, and $n^2 + 1 = \frac{64}{36} + \frac{36}{36} = \frac{100}{36}$ = a fquare, &c. &c. Hence we may find as many right-angled triangles as we pleafe, all having 1 for their bafe.

2. Required x when $x^2 + x$ is a fquare.

Affume $x^2 + x = \overline{x - z}|^2 = x^2 - 2xz + z^2$, then $2xz + x = z^2$, and $x = \frac{z^2}{2z + 1}$.

If $z = 1$, $x = \frac{1}{3}$, and $x^2 + x = \frac{1}{9} + \frac{3}{9} = \frac{4}{9}$ = a fquare.

If $z = 2$, x is $= \frac{4}{5}$, and $x^2 + x = \frac{16}{25} + \frac{20}{25} = \frac{36}{25}$ = a fquare, &c.

3. Find an integral value of x, fuch that $16x^2 + x - 1$ may be a fquare.

Affume $16x^2 + x - 1 = \overline{4x - a}|^2 = 16x^2 - 8ax + a^2$, $8ax + x = a^2 + 1$, and $x = \frac{a^2 + 1}{8a + 1} = \frac{2}{9}, \frac{5}{17}$, or $\frac{2}{5}, \frac{17}{33}, \frac{26}{41}, \frac{37}{49}, \frac{50}{57}, \frac{65}{65} = 1$.

Anf. If $a = 16$, $x = \frac{257}{129}$ almoft 2.

4. Make $2x^2 - 2x + 1$, a fquare.

Affume $2x^2 - 2x + 1 = \overline{2ax - 1}|^2 = 4a^2 x^2 - 4ax + 1$, then $2x - 2 = 4a^2 x - 4a$, or $4a^2 x - 2x = 4a - 2$, and $x = \frac{2a - 1}{2a^2 - 1} = 1 . \frac{3}{7}, \frac{5}{17}$, &c.; if $a = \frac{3}{4}$ x is $= 4$, and the given expreffion $= 25$, &c.

5. Find a value of y, fuch as may make $3y^2 + 12y + 9$, a fquare.

Affume $3y^2 + 12y + 9 = \overline{3y - 3}|^2 = 9y^2 - 18y + 9$, then $3y + 12 = 9y - 18 . 6y = 30$, and $y = 5$ ∴ 144 = fquare required.

6. Given $\sqrt{7z^2 + 1} = m$, to find m a whole number.

Since $7z^2 + 1 = m^2$, m is lefs than $3z$. Affume $7z^2 + 1 = \overline{3z - a}|^2 = 9z^2 - 6az + a^2$, $2z^2 - 6az = -a^2 + 1$; $z^2 - 3az = \frac{-a^2 + 1}{z}$; $z^2 - 3az + \frac{9a^2}{4} = \frac{7a^2 + 2}{4}$, and $z = \frac{3a + \sqrt{7a^2 + 2}}{2}$. If $a = 1$, $z = 3$, and $m = 8$.

7. Required a rational value of $\sqrt{v^4 - 2}$.

Affume $v^4 - 2 = \overline{v^2 - a^2}|^2 = v^4 - 2a^2 v^2 + a^4$, $2a^2 v^2 = a^4 + 2$; $v^2 = \frac{a^4 + 2}{2a^2} = \frac{2a^4 + 4}{4a^2}$. Here $2a^4 + 4$ muft

be

be made a square, suppose $\overline{2+a^2b^2}|^2 = 4+4a^2b^2+a^4b^4$, or $2a^2 = 4b^2+a^2b^4$, $2a^2-a^2b^4 = 4b^2$, and $a^2 = \frac{4b^2}{2-b^4}$ = a square. If $b=1$, then $a=2$, $v=\frac{3}{2}$, $v^4-2 = \frac{81}{16}-\frac{32}{16}=\frac{49}{16}$, and $\sqrt{v^4-2}=\frac{7}{4}$.

8. Find such a value of v as may make $\sqrt{2-v^4}$ rational, v is less than 1.

Assume $v=1-a$, or $v^4 = 1-4a+6a^2-4a^3+a^4$, then $2-v^4 = 1+4a-6a^2+4a^3-a^4$ = suppose $\overline{1+2a-5a^2}|^2 = 1+4a-6a^2-20a^3+25a^4$; or $25a^4-20a^3 = 4a^3-a^4$; $26a=24$, and $a=\frac{12}{13}$ ∴ $v = 1-a=\frac{1}{13}$, and $\sqrt{2-v^4} = \sqrt{\frac{57122-1}{28561}} = \frac{239}{169}$.

9. Make $2x^3+2x+4$ a rational square, when x is not $=\frac{1}{8}$.

Assume $2x^3+2x+4 = \overline{2+2ax}|^2 = 4+8ax+4a^2x^2$, $x^2+1 = 4a+2a^2x$; $x^2-2a^2x = 4a-1$; $x^2-2a^2x+a^4 = a^4+4a-1$, and $x = a^2+\sqrt{a^4+4a-1}$. To make a^4+4a-1 a square, let $b=4a-1$, or $a=\frac{b+1}{4}$, then $a^4 = \frac{b^4+4b^3+6b^2+4b+1}{256}$, or $a^4+4a-1 = \frac{b^4+4b^3+6b^2+260b+1}{256}$ to be made a square, suppose it $=\frac{\overline{1+130b-b^2}|^2}{16} = \frac{b^4-260b^3+16898b^2+260b+1}{256}$, then $4b^3+6b^2 = 16898b^2-260b^3$, or $2b+3 = 8449-130b$; $132b = 8446$, and $b=\frac{4223}{66}$ ∴ $a=\frac{b+1}{4}=\frac{4289}{264}$, $x=528$, and $2x^3+2x+4 = 294396964 = \overline{17158}|^2$.

10. Find such values of x and y, that $x^2+ay^2=b^2$ may be rational.

Assume $x=b-my$, or $x^2=b^2-2bmy+m^2y^2$, then $b^2-2bmy+m^2y^2+ay^2=b^2$, or $m^2y^2+ay^2=2bmy$, $m^2y+ay=2bm$, and $y=\frac{2bm}{m^2+a}$. But $x^2=b^2-ay^2$ $= b^2-\frac{4b^2am^2}{\overline{a+m^2}|^2} = \frac{b^2\times\overline{a+m^2}|^2-4am^2}{\overline{a+m^2}|^2} = \frac{b^2\times\overline{a^2-2am^2+m^4}}{\overline{a+m^2}|^2}$, and $x=\pm\frac{b.\overline{a-m^2}}{a+m^2} = b-my$ $= b-\frac{2bm^2}{a+m^2} = \frac{b.\overline{a+m^2-2m^2}}{a+m^2} = \frac{b.\overline{a-m^2}}{a+m^2}$.

11. Make $1+2x-x^2+x^3$ a square.

Assume $\overline{1+x}|^2 = 1+2x+x^2 = 1+2x-x^2+x^3$, or $x^2=x^3-x^2$, $2x^2=x^3$ and $x=2$.

12. Make $4+6x-5x^2+3x^3$ a square.

Assume it $=\overline{2+ax}|^2 = 4+4ax+a^2x^2$. Now to make the second term vanish from each side, as well as the 1st, $4a$ must be $=6$, or $a=\frac{3}{2}$. Then $\frac{9x^2}{4} = 3x^3-5x^2$, or, $\frac{29x^2}{4}=3x^3$, and $x=\frac{29}{12}$, and the expression $= \sqrt{\frac{8}{2}+\frac{29}{2}+\frac{\overline{29}|^2}{64}} = \frac{45}{8} = 5\frac{5}{8} = \sqrt{\frac{18235}{576}} = \sqrt{\frac{2025}{64}}$.

13. Make $a^2+bx+cx^2+dx^3+ex^4$ a square.

Assume it $=\overline{a+mx+nx^2}|^2 = a^2+2amx+\left.\begin{matrix}2an\\ m^2\end{matrix}\right\}x^2 +2mnx^3+n^2x^4$. Here $2am=b$, or $m=\frac{b}{2a}$, and $2an+m^2=c$, or $n=\frac{c-m^2}{2a}$, then $dx^3+ex^4 = 2mnx^3+n^2x^4$: $d+ex = 2mn+n^2x$; $ex-n^2x=2mn-d$, and $x=\frac{2mn-d}{e-n^2}$.

14. Make $a+ex^4$ a square. Suppose one value of $x=n$, and $a+en^4=s^2$. To find other values of x, put $x=n+y$, or $x^4=n^4+4n^3y+6n^2y^2+4ny^3+y^4$, then $a+ex^4 = a+en^4+4en^3y+6en^2y^2+4eny^3+ey^4$, or writing s^2 for $a+en^4$, $s^2=4en^3y+6en^2y^2+4eny^3+ey^4$ is to be made a square, as the 13th.

PROB. II.

15. To find two numbers, x and y, such that x^2+y may be a square, and $x+y$ its root. We have $x^2+y=\overline{x+y}|^2 = x^2+2xy+y^2$, $y=2xy+y^2$, $y+2x=1$, and $y=1-2x$, where x may be any fraction less than $\frac{1}{2}$. Suppose $x=\frac{1}{3}$, then $y=\frac{1}{3}$, $x^2+y=\frac{4}{9}$, and $x+y=\frac{2}{3}$ its root, if $x=\frac{2}{5}$, $y=\frac{1}{5}$, $x^2+y=\frac{9}{25}$, and $x+y=\frac{3}{5}$, &c. &c.

PROB. III.

16. To find two numbers, x and y, such that $x+y$ may be a square, and x^2+y its root.

Let $x^2+y=nx$, then $x+y=n^2x^2$, whence $y=n^2x^2-x=nx-x^2$, $n^2x+x=n+1$, and $x=\frac{n+1}{n^2+1}$, $y=\overline{n-x}.x$, suppose $n=2$, $x=\frac{3}{5}$, $y=\frac{21}{25}$, and $x+y=\frac{36}{25}$, and $x^2+y=\frac{36}{25}=\frac{6}{5}$.

PROB. IV.

17. To find a number which being divided into any two parts, x and y, x^2+y may be always equal to y^2+x.

1. Let az and bz denote the required parts, then $a^2z^2+bz = az+b^2z^2$; $a^2z+b=a+b^2z$, or $a^2z-b^2z=a-b$, and $z=\frac{a-b}{a^2-b^2}=\frac{1}{a+b}$, and $az=\frac{a}{a+b}$ = one part, and $bz=\frac{b}{a+b}$ = the other part, and both added together $=\frac{a+b}{a+b}=1$, the number required.

For let x and $1-x$ be any two parts of 1. Then $x^2+1-x = \overline{1-x}|^2+x = 1-2x+x^2$, or, 2d if $x^2+y = y^2+x$, or $x^2-y^2=x-y$, then $x+y=1$.

To find two numbers, such that their sum being increased and lessened either by their difference, or the difference of their squares, the sums and remainders shall be all squares.

18. Let $25x^2$ be the sum, and $24x^2$ the difference of the required numbers. Then $25x^2\pm24x^2$ are evidently squares. More-

Moreover, $\frac{25x^2}{2} + \frac{24x^2}{2} = \frac{49x^2}{2}$ = greater number, and $\frac{x^2}{2}$ = leſs; the diff. of their ſquares is $\frac{2400x^4}{4} = 600x^4$.

The two remaining conditions are, that $25x^2 \pm 600x^4$ are to be ſquares. Divide by $25x^2$, then $1 \pm 24x^2$ are to be ſquares; firſt make $1 - 24x^2$ a ſquare: Aſſume $\overline{1 - ax}|^2 = 1 - 2ax + a^2x^2 = 1 - 24x^2$, or, $a^2x^2 + 24x^2 = 2ax$; $a^2x + 24x = 2a$, and $x = \frac{2a}{a^2 + 24}$ (if $a = 4$) $\frac{8}{40} = \frac{1}{5}$, and $x^2 = \frac{1}{25}$. Therefore, $\frac{49}{50}$, and $\frac{1}{50}$, are the numbers required.

Prob. V.

19. To find two ſquare numbers ſuch, that the ſum of them may be a ſquare, the difference of them a cube, and the roots of the ſquare and cube equal.

Since the ſum of the two numbers is to be a ſquare, let $9x^2$ and $16x^2$ denote the numbers ſought, then their ſum $25x^2$ is a ſquare, but their diff. $7x^2$ is to be a cube, and $5x = \overline{7x^2}|^{\frac{1}{3}}$ per the laſt condition of the queſtion. We have $125x^3 = 7x^2$, or $x = \frac{7}{125}$, $9x^2 = \frac{441}{15625}$, and $16x^2 = \frac{784}{15625}$ = the numbers required.

Prob. VI.

20. To find three numbers A, B, and C, ſuch that $A^2 + BC$, $B^2 + AC$, and $C^2 + AB$, may be all ſquares.

Let 1, $x - 1$, and $4x$, denote the three numbers required; then the two firſt conditions are ſatisfied; for $A^2 + BC = 1 + 4x^2 + 4x = \overline{2x - 1}|^2$, and $B^2 + AC = \overline{x - 1}|^2 + 4x = x^2 + 2x + 1 + 4x = \overline{x + 1}|^2$; ſo that we have only to make $C^2 + AB = 16x^2 + x - 1$ a ſquare.

Aſſume $\overline{4x - a}|^2 = 16x^2 - 8ax + a^2 = 16x^2 + x - 1$, or $8ax + x = a^2 + 1$, or $x = \frac{a^2 + 1}{8a + 1}$; and the three numbers are 1, $\frac{a^2 - 1}{8a + 1} - 1$, and $\frac{4 \cdot \overline{a^2 + 1}}{8a + 1}$; or in a common denominator $\frac{8a + 1}{8a + 1}$, $\frac{a^2 - 8a}{8a + 1}$, and $\frac{4 \cdot \overline{a^2 + 1}}{8a + 1}$. Or, $8a + 1$, $a^2 - 8a$, and $4 \cdot \overline{a^2 + 1}$, where a may be any number greater than 8. If $a = 9$, the numbers are 73, 9, and 328. If $a = 10$, the numbers are 81, 20, 404, &c. &c.

Prob. VII.

21. To find two ſquare integers, whoſe ſum may be a □; or to find as many right-angled triangles, in whole numbers, as we pleaſe.

Take r and s, any two unequal numbers, r the greater; then make $\overline{r^2 - s^2}|^2 = r^4 - 2r^2s^2 + s^4$, and $\overline{2rs}|^2 = 4r^2s^2$, the ſquare number required. For their ſum is $r^4 + 2r^2s^2 + s^4 = \overline{r^2 + s^2}|^2$ = a ſquare.

Prob. VIII.

22. To divide a given ſquare C^2 into two other ſquares a^2 and b^2: or from a given hypothenuſe, to find the ſides of a right-angled triangle.

1. We have $C^2 - a^2 = b^2 = \square$, which put $= \overline{na - c}|^2 = n^2a^2 - 2nac + c^2$; then $c^2 = a^2 + b^2 = a^2 + n^2a^2 - 2nac + c^2$, or $2nac = n^2a^2 + a^2$; $2nc = n^2a + a = a \cdot \overline{n^2 + 1}$, and $a = \frac{2nc}{n^2 + 1}$; therefore, if a and n be rational, b will be ſo.

Ex. If $c = 5$, $n = 1$, then $a = 5$, and $b = 0$. If $c = 2$, $n = 3$, then $a = \frac{6}{5}$,

$n = 2$	$a = 4$	$b = 3$,
$n = 3$	$a = 3$	$b = 4$,
$n = 4$	$a = \frac{40}{17}$	$b = \frac{75}{17}$.

Or, thus:

2. Let C^2 = the given ſquare, a^2 one of its parts, and $c^2 - a^2$, the other to be made a ſquare. Aſſume it $= \overline{ra - c}|^2 = a^2r^2 - 2arc + c^2$; or, $2arc = r^2a^2 + a^2$, $2rc = r^2a + a$, and $a = \frac{2rc}{r + 1}$, as above.

Or, thus: 3. Let $\overline{sa}|^2 = s^2a^2$, and $\overline{ra - c}|^2 = r^2a^2 - 2arc + c^2$ be the two ſquares into which c^2 is to be reſolved. Then $c^2 - s^2a^2 = r^2a^2 - 2arc + c^2$; $2arc = r^2a^2 + s^2a^2$; $2rc = r^2a + s^2a$, and $a = \frac{2rc}{r^2 + s^2}$. ∴ $sa = \frac{2rsc}{r^2 + s^2}$ = the root of one of the ſquares ſought, and $ra - c = \frac{2r^2c}{r^2 + s^2} - \frac{c}{1} = \frac{2r^2c - r^2c - s^2c}{r^2 + s^2} = \frac{r^2c - s^2c}{r^2 + s^2}$ = root of the other.

1. Hence c, $\frac{2rsc}{r^2 + s^2}$, and $\frac{r^2c + s^2c}{r^2 + s^2}$ are the roots of three ſquares, of which the ſum of the two laſt ſquares is equal to the firſt, or the three roots are the ſides of a right-angled triangle, whoſe hypothenuſe is equal c.

2. If each of theſe ſides be multiplied by $r^2 + s^2$, we ſhall have $r^2c + s^2c$, $2rsc$, and $r^2c - s^2c$ for the three ſides of another triangle; or, by dividing each by c, we have $r^2 + s^2$, $2rs$, and $r^2 - s^2$.

Prob. IX.

23. To find two numbers whoſe ſum and difference may be both ſquares. If $r^2 + s^2$ be one of the numbers, and $2rs$ the other, the problem is ſolved. But $r^2 + s^2$ is equal the ſquare of the hypothenuſe of a right-angled triangle, and $2rs$ the double product of its ſides; therefore, the ſquare of the hypothenuſe $\pm$, the double product of its ſides, is always a ſquare.

Prob. X.

24. Given the difference of two ſquares to find the ſquares.

Rule.—Reſolve the given difference into any two factors, and the $\frac{1}{2}$ ſum of them is the root of the greater ſquare, and the $\frac{1}{2}$ difference the root of the leſſer. For $c^2 - a^2 = \overline{c + a} \cdot \overline{c - a}$.

Ex.—Find two ſquares whoſe difference may be 12. Factors 2 and 6, $\frac{1}{2}$ ſum 4, $\frac{1}{2}$ diff. 2. Or, factors 3 and 4, $\frac{1}{2}$ ſum $\frac{7}{2}$, $\frac{1}{2}$ diff. $\frac{1}{2}$, and $\frac{49}{4} - \frac{1}{4} = 12$.

Prob XI.

25. To reſolve a duplicate equality, or to make two propoſed expreſſions ſquares.

General Rule.

Reſolve the difference of the propoſed ſquares into two ſuch factors, that the ſquare of the $\frac{1}{2}$ ſum of them may be made

made equal to the greater square, or the square of their $\frac{1}{2}$ difference to the less.

Ob.—This problem differs from the last in having the proposed squares limited in form or magnitude.

Examples.

Of the resolution of a duplicate equality.

1. Find such a value of x, that $x + 1$, and $x - 1$, may both be squares. The difference is 2. Factors 1 and 2, $\frac{1}{2}$ sum $\frac{3}{2}$, $\frac{1}{2}$ diff. $\frac{1}{2}$ and $\frac{9}{4}$, $\frac{1}{4}$ the two squares, therefore $x = \frac{5}{4}$.

2. Find x when $x^2 + x$, and $x^2 - x$, are squares, their sum is $2x^2$, we are to find two squares whose sum is $2x^2$. But $\frac{x^2}{25} + \frac{49x^2}{25} = \frac{50x^2}{25}$. Put $x^2 - x = \frac{x^2}{25}$, or $x - 1 = \frac{x}{25}$, $24x = 25$, and $x = \frac{25}{24}$.

Or let c^2 = hypothenuse, and p = double product of sides, then $c^2 + p$ and $c^2 - p$ are squares (per 23.), consequently $c^2z^2 + pz^2$, and $c^2z^2 - pz^2$ are squares. We have only to find such a value of z, that c^2z^2 may be = the square of pz^2. Let $cz = pz^2$, and $z = \frac{c}{p}$; $z^2 = \frac{c^2}{p^2}$, and $pz^2 = \frac{c^2}{p} = x$ = the number required, *i. e.* the square of any hypothenuse divided by the double product of the sides gives x.

As 3, 4, 5, gives $\frac{25}{24} = x$, 5, 12, 13, gives $\frac{169}{120}$, &c.

3. Make $2x^2 + 1$, and $4x + 1$, squares, while x has the same value in both. The difference is $2x^2 - 4x$, the factors $2x$ and $x - 2$, the difference $\frac{x}{2} + 1$. Put the less square $4x + 1 = \left(\frac{x}{2} + 1\right)^2 = \frac{x^2}{4} + x + 1$, or $16x = x^2 + 4x$, or $x = 12$, and the proposed expressions are $289 = 17^2$ and 49.

4. Find such a value of x, as may make $10 - 2x$, and $10 - x^2$ squares. Diff. $x^2 - 2x$. Factors x and $x - 2$. The $\frac{1}{2}$ diff. $= 1$ = less square $= 10 - x^2$, or $x = 3$. Or, $\frac{1}{2}$ sum $= x - 1$, and $x^2 - 2x + 1 = 10 - 2x$, $x^2 = 9$, and $x = 3$.

5. To make $ax + c$, and $bx + d$ both squares, where a is greater than b, and the signs either + or −.

Rule. Let $q = \frac{b}{a - b}$. Mult. the diff. of the given squares by q, and subtract the prod. from the less square. Call the remainder r. Then if r, or $\frac{-q}{r}$, be a square, the duplicate equality is resolvable: thus, find two squares m^2 and n^2, the diff. of which may be to the excess of the less above r as 1 : 9. When r is a square, $(y + \sqrt{r})^2$ must be made equal to $n^2 = bx + d$, but when $\frac{-q}{r}$ is a square, n^2 must be made equal to $bx + d$.

Ex.—Make $8x + 4$, and $6x + 4$ both squares; their difference is $2x$ and $q = 3$, product $6x$, and $r = 4$ a square. Here $(y + 2)^2 = n^2 = y^2 + 4y + 4$, or $n^2 - 4 = y^2 + 4y$ ∴ $m^2 - n^2 = \frac{y^2 + 4y}{3}$, and $m^2 = y^2 + 4y + 4 + \frac{y^2 + 4y}{3} = \frac{4y^2}{3} + \frac{16y}{3} + 4$; to avoid fractions multiply by 9, then $9m^2 = 12y^2 + 48y + 36$ or $\frac{9m^2}{4} = 3y^2 + 12y + 9$ to be made a square: $y = 5$ ∴ $n^2 = 49 = 6x + 4$, and $x = \frac{45}{6}$ ∴ $8x + 4 = 64$.

Prob. XII.

26. To find two numbers, A and B, such that A + B, $A^2 + B$, and $B^2 + A$, may be all squares. Let $x = A$, $3x^2 = B$.

Then $A^2 + B = 4x^2$ is a square.

But $A^2 + B = 3x^2 + x$,

And $B + A = 9x^4 + x$ are to be squares.

The difference is $9x^4 - 3x^2$. Factors $3x^2$ and $3x^2 - 1$, &c. $x = \frac{1}{6}$, $A = 3x^2 = \frac{1}{12} = B$.

Prob. XIII.

27. To find two numbers, A and B, such that, A + 1, B + 1, A + B + 1, and A − B + 1, may be all squares.

1. Let $A = x^2 + 2x$, and $B = x^2 - 2x$, and the two first conditions are satisfied; but $2x^2 + 1$, and $4x + 1$, are also to be squares; (per XI. 3.) $x = 12$, $A = 168$, $B = 120$.

2. Let $A = 9x^2 + 6x$, $B = y^2 - 1$, then $A + B + 1 = 9x^2 + 6x + y^2$ = a square is the third condition, suppose it $= z^2$; then $z^2 - y^2 = 9x^2 + 6x$. Factors x and $9x + 6$, $\frac{1}{2}$ diff. $= 4x + 3$; or $y^2 = 16x^2 + 24x + 9$; or $B = 16x^2 + 24x + 8$. But $B - A + 1 = 7x^2 + 18x + 9$ is also to be a square, suppose $= (3x - 3)^2 = 9x^2 - 18x + 9$; or $2x^2 = 36x$, and $x = 18$ ∴ $A = 3024$, $B = 5624$; $B + A = 8648$, $B - A = 2600$, each of which + 1 is the square of 55, 75, 93, and 51.

Prob. XIV.

28. To find three numbers such, that if the square of each be added to the sum of the two, the three sums may be squares.

1st. $(x + 1)^2 = x^2 + 2x + 1$ ∴ if x, $2x$, and 1, denote the three numbers, the first condition is satisfied. But $4x^2 + x + 1$, and $3x + 1$, are also to be made squares. Difference is $4x^2 - 2x$. Factors x, and $4x - 2$, $\frac{1}{2}$ diff. $\frac{3x}{2} - 1$ ∴ $\frac{9x^2}{4} - 3x + 1 = 3x + 1 \,.\, 9x^2 = 24x$, $x = \frac{8}{3}$, $2x = \frac{16}{3}$, and 1, are the numbers required.

Prob. XV.

29. To find two numbers, A and B, such that AB + A, AB + B, and AB + A + B, may be all squares.

Let $x = A$, $x^2 = AB + A$ = a square; then $x^2 - x = AB$, and $x - 1 = B$, and $2x - 1 = A + B$. But $AB + B = x^2 - 1$, and $AB + A + B = x^2 + x - 1$, are to be made squares. Diff. is x. Factors $2x$ and $\frac{1}{2}$, $\frac{1}{2}$ diff. $x - \frac{1}{4}$, or $x^2 - \frac{x}{2} + \frac{1}{16} = x^2 - 1$, or $\frac{x}{2} = 1 + \frac{1}{16} = \frac{17}{16}$, and $x = \frac{17}{8} = A$, and $B = x - 1 = \frac{9}{8}$.

Scholium. 30. To find the proper factors, into which the difference of any proposed square ought to be reduced.

Rule. Put z = one of the factors, and the given difference divided by z = the other; then by making the square of the $\frac{1}{2}$ sum or $\frac{1}{2}$ difference equal to the greater or less of the proposed squares, find some suitable value of z.

Examples.

1. Find the proper factors of the diff. x, when $x^2 + x - 1$ and $x^2 - 1$ are to be squares.

Let z and $\frac{x}{z}$ = the factors; the $\frac{1}{2}$ diff. $= \frac{x}{2z} - \frac{z}{2}$, or $\frac{x^2}{4z^2} - \frac{x}{2} + \frac{z^2}{4} = x^2 - 1$. We see that x may have a rational value, if $\frac{x^2}{4z^2} = x^2$, or $4z^2 = 1$, and $z = \frac{1}{2}$ ∴ $\frac{x}{z} = 2x$ the factors.

2. Find the proper factors for making two squares, m^2 and n^2, whose difference is d, such that the least, n^2, may exceed any given number c.

Factors z and $\frac{d}{z}$; $\frac{1}{2}$ difference $= \frac{z}{2} - \frac{d}{2z}$, or $\frac{\overline{z^2 - d}|^2}{2z} = \frac{z^4 - 2dz^2 + d^2}{4z^2} = n^2$, is to be greater than c, or $z^4 - 2dz^2 + d^2$ greater than $4z^2c$, or $z^2 - 4z^2c - 2dz^2 + d^2$ greater than o.

Let $z^4 - 4z^2c - 2dz^2$ greater than o, or $z^2 - 4c - 2d$ greater than o; and $z^2 =$, or greater than $4c + 2d$.

Cor. If $c = nd$, then $z^2 =$, or greater than $d.\overline{4n + 2}$. Hence, if we take $d =$ a square, as many right-angled triangles as we please may be found, all having the same base $= \sqrt{d}$.

Prob. XVI.

31. To find two numbers such, that the square of each, being added to the sum of both, may make two square numbers.

1. Let $x =$ one of the numbers; its square is x^2, and $x^2 + 2x + 1$ is a square. Let $2x + 1$ be the sum of both numbers; then $x + 1 =$ the greater, its square is $x^2 + 2x + 1$, and if we add the sum of both, $x^2 + 4x + 2$ is to be made a square, suppose $= \overline{x - z}|^2 = x^2 - 2xz + z^2$, or, $2xz + 4x = z^2 - z$, and $x = \frac{z^2 - 2}{2z + 4}$, where z may be any number greater than $1\frac{1}{2}$, if $z = 2$, $x = \frac{1}{4}$, and $x + 1 = \frac{5}{4}$, &c.

Prob. XVII.

32. To find two such numbers, that their product $\pm$ their sum may be squares.

1. Let $x =$ one of the numbers, and $a^2x + b^2x =$ the other: then $a^2x^2 + b^2x^2 =$ their product: but $a^2x^2 \pm 2abx^2 + b^2x^2 = \overline{ax \pm bx}|^2 =$ a square. We have only to make $2abx^2 = a^2x + b^2x + x =$ the sum of the two numbers: or, $x = \frac{a^2 + b^2 + 1}{2ab}$, where a and b may be any numbers at pleasure: if $a = 1$, $b = 2$, then $x = \frac{3}{2}$, and $\frac{15}{2} =$ greater: for their product $= \frac{45}{4}$, and sum $= \frac{36}{4}$; and $\frac{81}{4}$, or $\frac{9}{4}$, are squares.

Prob. XVIII.

33. To find three numbers such, that their sum and the sum of every two of them may be squares.

1. Let $x^2 + 2x + 1 = \overline{x + 1}|^2$ be the sum of the three. Let x^2 be the sum of the first and second: then $2x + 1 =$ third number: Let $x^2 - 2x + 1$ be the sum of the second and third numbers: then $x^2 - 4x$ is the second number, which taken from x^2 leaves $4x$ for the first number ∴ the three numbers required are $4x$, $x^2 - 4x$, and $2x + 1$.

2. But the sum of the first and third $= 6x + 1$ is also to be a square, suppose $= a^2$: then $x = \frac{a^2 - 1}{6}$: where a^2 may be any square number greater than 25; because the second number $= x^2 - 4x$, or $x - 4$ must be greater than o ∴ x greater than 4, bx greater than 24, and $bx + 1$ greater than 25.

Examples.

1. Suppose $a^2 = 49$: then $x = 8$, $4x = 32$, $x^2 - 4x = 32$, and $2x + 1 = 17$
$a^2 = 121$ $x = 20$ 80   320   41, &c.

Prob. XIX.

34. To find a number which being divided into any two parts, the square of either part + 100 times the other part, shall make a square number.

Let $y =$ the number sought: x one part, and $y - x =$ the other: then $x^2 + 100y - 100x$ is to be a square, suppose $\overline{x - z}|^2 = x^2 - 2xz + z^2$, or $100y - 100x = z^2 - 2zx$: Now as the object is to find y without limiting x; let $2z = 100$, or $z = 50$: then $100y = 2500$, or $y = 25$: therefore $x^2 + 100.\overline{25 - x}$ will be a square, let x be what it will.

Generally.

To determine y when $s^2x^2 + z.\overline{y - x}$ is a square.

Let $s^2x^2 + ry - rx = \overline{sx - z}|^2 = s^2x^2 - 2szx + z^2$: let $r = 2sz$, then $2szy = z^2$, and $y = \frac{z}{2s}$; but $z = \frac{r}{2s}$ ∴ $y = \frac{r}{4s^2}$, where r may be = any square number, and $s = 1$.

Prob. XX.

35. To find two numbers in the ratio of $a : b$, such that either of them, added to the square of the other, may make a square.

First, let $n - x =$ the less of the two numbers sought, and $4nx =$ greater: then $\overline{n - x}|^2 + 4nx = \overline{n + x}|^2$ one condition satisfied. Second, but $a : b :: n - x : 4nx$: or $4anx = bn - bx$; or $x = \frac{bn}{4an + b}$.

Therefore, $n - x = \frac{4an^2 + bn - bn}{4an + b} = \frac{4an^2}{4an + b} =$ less number, and $4nx = \frac{4bn^2}{4an + b} =$ greater, the square of which + the less is also to be a square.

Or, $\frac{16b^2n^4}{16a^2n^2 + 8abn + b^2} + \frac{4an^2}{4an + b} = \frac{16b^2n^4 + 16a^2n^3 + 4abn^2}{16a^2n^2 + 8abn + b^2}$; or, $4b^2n^4 + 4a^2n^3 + abn^2$ is to be made a square: suppose $= \overline{2bn^2 - zn}|^2$ (z being greater than ab) $= 4b^2n^4 - 4bzn^3 + z^2n^2$, or $4a^2n^3 + 4bzn^3 = z^2n^2 - abn^2$: or $n = \frac{z^2 - ab}{4a^2 + 4bz}$. Third, or to make $16b^2n^4 + 16a^2n^3 + 4abn^2$ a square, suppose it $= \overline{4bn^2 - zn}|^2$ (z^2 being greater than $4ab$). Then $16a^2n^3 + 8bzn^3 = z^2n^2 - 4abn^2$; or $n = \frac{z^2 - 4ab}{16a^2 + 8bz}$. If $z = 10$, $a = 2$, $b = 3$, then $n = \frac{1}{4}$ and $\frac{2}{20}$ and $\frac{3}{20}$ the numbers required.

Lemma:

Lemma.—36. There are many numbers which cannot be divided into two rational ſquares.

1ſt. Every even ſquare number is diviſible by 4: for its root may be $2x$ and $4x^2$ the number.

2d. Every odd ſquare number -1 is diviſible by 4: for its root is $2x+1$ and $4x^2+4x+1$ the number.

3d. Every number = the ſum of two even ſquares is diviſible by 4. Per 1ſt.

4th. Every number = the ſum of two odd ſquares -2 is diviſible by 4. Per 2d.

5th. Every number = the ſum of an even and an odd ſquare -1 is diviſible by 4. Per 1ſt and 2. Hence,

6th. If any number being divided by 4 leave a remainder equal 3, it cannot be compoſed of two integral ſquares. Nor of two ſquare fractions.

Prob. XXI.

37. To divide any number compoſed of two known ſquares, as $\overline{a^2+b^2}$ into two other ſquares.

Let r be greater than s, and not as $a:b$, nor as $a+b:a-b$.

Aſſume $\overline{rx-a}|^2 = a^2$, and $\overline{sx-b}|^2 = b^2$, or $a^2+b^2 = a^2+b^2+(r^2x^2+s^2x^2-2arx-2bsx)$, or $r^2x+s^2x = 2ar+2bs$, and $x = \frac{2ar+2bs}{r^2+s^2}$ ∴ $rx-a = \frac{2ar^2+2bsx-ar^2-as^2}{r^2+s^2} = \frac{ar^2+2bsz-as^2}{r^2+s^2}$ = ſide of greater ſquare, and $sx-b = \frac{2asz+2bs^2-bz^2-bs^2}{r^2+s^2} = \frac{2ars+bs^2-bz^2}{r^2+s^2}$ = ſide of leſs ſquare.

Let $d = r^2-s^2$, $e = 2rs$, and $f = r^2+s^2$: then

$$\left.\begin{array}{l} ar^2-as^2+2brs=ad+be \\ 2ars-br^2+bs^2=ae-bd \end{array}\right\}\text{and}\left\{\begin{array}{l} \frac{ad+be}{f}=\text{ſide of greater ſq.} \\ \frac{ae-bd}{f}=\text{ſide of leſs ſq.} \end{array}\right.$$

Ob. 1. If $b=0$, this prob. and its ſolution, becomes the ſame as Prob. VIII. *viz.* $\frac{ad}{f}$ and $\frac{ae}{f}$ are the ſides of the required ſquares.

Ob. 2. If $\overline{sx+b}|^2$ had been aſſumed $=b^2$, the reſults would have been $\frac{ad-be}{f}$ = ſide of greater, and $\frac{ac+bd}{f}$ = ſide of the leſſer ſquare.

The four fractions exhibiting both ſolutions are, $\frac{ad}{f}, \frac{ac}{f}, \frac{bd}{f}, \frac{be}{f}$. Hence, if d, e, and f be the ſides of a right-angled triangle, and a and b the roots of the original ſquares, and the two ſides of the triangle be multiplied by the roots of the ſaid ſquares, and ſet down in order, thus, $\frac{ad}{f}, \frac{ac}{f}, \frac{bd}{f}, \frac{bc}{f}$: then the ſum of the extremes and difference of the means will be the ſides of the two ſquares required.

Examples.

38. 1. Required to divide $2 = 1^2+1^2$ into two unequal ſquares. 1. Let the triangles be 3, 4, and 5; then the fractions are $\frac{3}{5}, \frac{4}{5}, \frac{3}{5}, \frac{4}{5}$, and $\frac{7}{5}$, and $\frac{1}{5}$, the ſides of $\frac{49}{25}+\frac{1}{25}=2$.

2. Let the triangle be 8, 6, 10; then the fractions are $\frac{8}{10}, \frac{6}{10}, \frac{8}{10}, \frac{6}{10}, \frac{14}{10}$, and $\frac{2}{10}$, as above.

If the triangle be 5, 12, 13, then $\frac{5}{13}, \frac{12}{13}, \frac{5}{13}, \frac{12}{13}, \frac{17}{13}$, and $\frac{7}{13}$ are the ſides of $\frac{289}{169}+\frac{49}{169}=\frac{338}{169}=2$.

3. Let 1 be divided into two ſquares. Here $b=0$, and $\frac{ad}{f}$ and $\frac{ae}{f}$ are the ſides of the ſquares required.

If the triangle be 3, 4, 5, we have $\frac{4}{5}$ and $\frac{3}{5}$.

If the triangle be 5, 12, 13, we have $\frac{12}{13}$ and $\frac{5}{15}$ the ſides of $\frac{144}{169}$, and $\frac{25}{169}=1$.

Prob. XXII.

39. To find four right angled triangles, in whole numbers, all having the ſame hypothenuſe.

Solution.—1. Take any two right-angled triangles, not ſimilar, as $\begin{Bmatrix} a, & b, & c. \\ 3, & 4, & 5, \end{Bmatrix}$ and $\begin{Bmatrix} d, & e, & f. \\ 5, & 12, & 13. \end{Bmatrix}$.

Multiply the three ſides of the firſt by f, and we have af, bf, $cf = 39, 52, 65$. Mult. 2nd by c, we have $dc, ec, cf = 25, 60, 65$, per 37, $ad+be$, $ae \backsim bd$, and $cf = 63, 16, 65$; or, $ae+bd$, $ad \backsim be$, and $cf = 56, 33, 65$.

Prob. XXIII.

40. To find four numbers, which, being ſeverally added to, or ſubtracted from, the ſquare of their ſum, ſhall make the ſeveral ſums, or remainders, all ſquare numbers.

1. Find (per 39.) four right-angled triangles, having the ſame hypothenuſe, which ſuppoſe $=h$.

Let p, p', p'', p''', denote the double product of their ſides. Then $h^2 \pm p$, $h^2 \pm p'$, $h^2 \pm p''$, $h^2 \pm p'''$, are all ſquares (per 23.); conſequently, $h^2x^2 \pm px^2$, $h^2x^2 \pm p'x^2$, $h^2x^2 \pm p''x^2$, and $h^2x^2 \pm p'''x^2$, are all ſquares.

2. But the condition is, that h^2x^2 ſhall be the ſquare of the ſum of $px^2+p'x^2+p''x^2+p'''x^2$.

Let $p+p'+p''+p'''=e$. Then h^2x^2 is to be = the ſquare of ex^2, or $hx = ex^2$, and $x = \frac{h}{e}$, or $x^2 = \frac{h^2}{e^2}$.

Therefore, $px^2, p'x^2, p''x^2, p'''x^2$, are $= \frac{ph^2}{e^2}, \frac{p'h^2}{e^2}, \frac{p''h^2}{e^2}, \frac{p'''h^2}{e^2}$, which are reſpectively the numbers required.

Demonſtration.—For the ſum of theſe four numbers is $\frac{ph^2+p'h^2+p''h^2+p'''h^2}{e^2} = \frac{eh^2}{e^2} = \frac{h^2}{e}$, and the ſquare of their ſum is $\frac{h^2}{e^2}$. But $\frac{h^4}{e^2} \pm \frac{ph^2}{e^2} = \frac{h^2 \pm ph^2}{e^2} = \frac{h^2}{e^2} \cdot h^2 \pm p$ = a ſquare (per 23,) &c. with the reſt.

Example. The four triangles in 39 give $h^2 = 4225$, $p = 4056$, $p' = 3000$, $p'' = 2016$, $p''' = 3696$, and $e^2 = 27888049$, and the four numbers are $\frac{17136600}{27888049}, \frac{12675000}{27888049}, \frac{8517600}{27888049}$, and $\frac{15615600}{27888049}$, and their ſum $= \frac{53944800}{27888049}$.

Prob. XXIV.

41. To find three numbers a, b, c, ſuch that, e being any given number, $ab+e$, $ac+e$, and $bc+e$, may be all ſquares.

Firſt.

1. Suppose a and b found. Put $ab + e = n^2$, then $ab = n^2 - e$. 2. To find a, b, and n, without trials, take any two numbers, r and s, r the greater, so that the square of either may be greater than e, and let $a = n + r$, $b = n - s$, then $ab = n^2 + rn - sn - rs = n^2 - e$ (1), or $n = \frac{rs - e}{r - s}$, $n + r = a = \frac{r^2 - e}{r - s}$, $n - s = b = \frac{s^2 - e}{r - s}$.

3. From $ab + e$, already made a square, take $ac + e$, the difference is $ab - ac = a . \overline{b - c}$ the factors (25.) The $\frac{1}{2}$ sum is $\frac{a + b - c}{2}$, the $\frac{1}{2}$ difference is $\frac{a - b + c}{2}$. 4. Again, from $ab + e$ take $bc + e$, the diff. is $ab - be = b . \overline{a - c}$, the $\frac{1}{2}$ sum is $\frac{a + b - c}{2}$, and $\frac{1}{2}$ diff. $\frac{a - b - c}{2}$.

Therefore if such a value of c can be found, that $\left|\frac{a + b - c}{2}\right|^2$ may be $= ab + e = n^2$, the problem is solved.

Let $\frac{a + b - c}{2} = \pm n$, then $c = a + b \pm 2n$, either of which values of c with a and b above are the numbers required.

5. But $a = n + r$, and $b = n - s$ $\therefore a + b = r - s + 2n$, and $a + b - 2n = r - s =$ less value of c, &c.

6. Corollary. Hence if $r - s = 1$, then n, a, b, &c. will be integers.

7. Example. Let $e = 3$, $r = 4$, and $s = 3$, then $a = 13$, $b = 6$, and $c = 1$, or 37, so that $c + e$, $b + e$, and $a + e$, are all squares.

Scholium. If the prob. had been to find $ab - e$, $ac - e$, and $bc - e$ all squares, the only alteration would be to change the sign of e, or find $a = \frac{r^2 + e}{r - s}$, $b = \frac{s^2 + e}{r - s}$, and the less value of $c = r - s$, or the greater $=$ the excess of $2a + 2b$ above $r - s$ as before.

Prob. XXV.

42. To find four numbers, such that, if 1 or any square number be added to the product of every two of them, all the sums may be squares.

1. Take a, b, and c, in arithmetical progression, their common difference 1. Then if x, $\overset{A}{a^2x + 2a}$, $\overset{B}{b^2x + 2b}$, and $\overset{C}{c^2x + 2x}$ denote the four numbers sought, every condition is answered, except BD + 1 = square. Let $a = 2$, $b = 3$, $c = 4$, then the four numbers sought are $\overset{A}{x}$, $\overset{B}{4x + 4}$, $\overset{C}{9x + 6}$, and $\overset{D}{16x + 8}$, $BD + 1 = 64x^2 + 96x + 33$. Let $\overline{8x - 6}|^2 = 64x^2 - 96x + 36$; $192x = 3$, and $x = \frac{1}{64}$.

3. Let $\overline{8x - 12}|^2 = 64x^2 - 192x + 144$; $288x = 111$, and $x = \frac{111}{288} = \frac{37}{96}$. Let $\overline{8x - 9}|^2 = 64x^2 - 144x + 81$; $240x = 48$, and $x = \frac{4}{20} = \frac{2}{10} = \frac{1}{5}$. Therefore, $\frac{2}{10}$, $\frac{48}{10}$, $\frac{78}{10}$, $\frac{112}{10}$, or, $\frac{1}{5}$, $\frac{24}{5}$, $\frac{39}{5}$, and $\frac{56}{5}$, are the numbers required, when 1 is the additive number. But if we suppose it some other square number, as 100, and multiply each of these numbers by its root, we shall have 2, 48, 78, 112, for the numbers required.

Prob. XXVI.

43. To find x and y, when $x - y$, $x^2 - y^2$, and $x^3 - y^3$ are all squares. Assume $x - y = a^2$, and $x + y = m^2a^2$, or $x^2 - y^2 = m^2a^4 =$ a square.

Now, $2x = m^2a^2 + a^2$, or $x = \frac{m^2a^2 + a^2}{2}$, and $y = \frac{m^2a^2 - a^2}{2}$. But $x^3 \quad y^3 = \frac{a^6 . 3m^4 + 1}{4}$, or $3m^4 + 1$ must be made a square; m must be $= 2$. Hence this

Rule. Take $x - y =$ any square number, and $x + y =$ 4 times that number, and find x and y required.

Examples. Let $x - y = 4$, and $x + y = 16$, then $x = 10$, and $y = 6$, and the three expressions 4, 64, and 784.

Prob. XXVII.

44. To find three numbers in geometrical progression such, that a given number being added to each may make them all squares.

Let a^2, ax, and x^2 denote the three numbers sought, and the first condition is satisfied.

Find two squares whose difference is s (24), and let the less $= a^2$, and the second condition is satisfied. But $ax + s$, and $x^2 + s$, are also to be squares. Their difference is $x^2 - ax$. Factors x and $x - a$, the $\frac{1}{2}$ difference is $\frac{a}{2} \therefore \frac{a^2}{4} = ax + s$, or $ax = \frac{a^2}{4} - s =$ 2d number, and the third is found by proportion.

Ob. $ax = \frac{a^2}{4} - s$ must be affirmative $\therefore a^2$ greater than $4s$. Whence this

Rule. Find two squares whose difference is s, and the less of them greater than $4s$, (30. 2.) call this less square a^2; the mean term is $\frac{1}{4}a^2 - s$, and the other extreme is found by proportion.

Examples.

1. Find three numbers in geometrical progression such, that $21 = s$ added to each, may make the sums squares. Factors 21 and $\frac{21}{21}$ and $\frac{1}{2}$ diff. $= 10\frac{1}{2} - \frac{1}{2} = 10$. The two squares are 121 and $100 = a^2$ greater than $4s = 84 \therefore 100 :$ 4 and $\frac{4}{25}$ are the numbers required.

2. Let $s = 19$, then 100 and $81 = a^2$ greater than $4s = 76$ and 81, $\frac{5}{4}$ and $\frac{25}{1296}$ are the numbers. Factors 19 and $\frac{19}{19}$ and $\frac{1}{2}$ diff. $= 9\frac{1}{2} - \frac{1}{2} = 9$.

Prob. XXVIII.

45. To find three square numbers in arithmetical progression.

Let, 1. $1 + 4d$, and $1 + 8d =$ denote the three numbers, then $1 + 4d$ and $1 + 8d$ are to be made squares.

Difference is $4d$, factors 2, and $2d$, $\frac{1}{2}$ sum $d + 1$, and $d^2 + 2d + 1 = 1 + 8d$, or $d^2 - 6d = 0$, or $d = 6$, so that 1, 25, and 49 are the numbers. Or, let x^2, x^2y^2, and $2x^2y^2 - x^2$ denote the three square numbers, then 1, y^2 and $2y^2 - 1$ are squares; and $y = 5 \therefore$ 1, 25, 49 multiplied by x^2, will give as many answers as we please.

Prob. XXIX.

46. To find three square numbers in harmonical proportion, *i. e.* to find x^2, b^2, a^2; when as $x^2 : a^2 :: x^2 - b^2 : b^2 - a^2$. Assume two known squares for b^2 and a^2, suppose 49 and 25, then as $x^2 : 25 :: x^2 - 49 : 24$, or $24x^2 = 25x^2 - 1225$, or $x^2 = 1225$.

Prob. XXX. *vide* Prob. XXVIII.

47. First find three square numbers in arithmetical progression, each of which will be the sum of two of the numbers sought, and have the same common difference as the numbers sought.

Thus let x^2, $x^2 + 20y$, and $x^2 + 40y$, denote three square numbers in arithmetical progression. Then diff. $=$ (25.) $20y$, the factors $2y$ and 10, the $\frac{1}{2}$ diff. of them is $y - 5 = x$. First $x^2 = \overline{y-5}^2 = y^2 - 10y + 25$ ∴ $x^2 + 20y = y^2 + 10y + 25 =$ a square; but $x^2 + 40y = y^2 + 30y + 25$ is also to be made a square.

Assume $\overline{y+a}^2 = y^2 + 2ay + a^2$; $30y + 25 = 2ay + a^2$, or $30y - 2ay = a^2 - 25$, and $y = \frac{a^2 - 25}{30 - 2a}$; a is evidently limited between 5 and 15. Let $a = 13$, then $y = 36$, $20y =$ common diff. $= 720$, and $x = 31$. So that $961 =$ square of 31, $1681 =$ square of 41, and $2401 =$ square of 49, are the three squares sought, and from the sum 961, and diff. 720, we find $120\frac{1}{2}$, $840\frac{1}{2}$, and $1560\frac{1}{2}$, the three numbers required. Or, by denoting the three required squares by x^2, $x^2 + 40y$, and $x^2 + 80y$, and proceeding as above, we have $y = \frac{a^2 - 100}{60 - 2a}$, a between 10 and 30; if $a = 26$, then $y = 72$, and $40y = 2880$, and $x = 62$, and the three squares, as well as the three numbers sought, $=$ 4 times those above the smallest positive integral answer.

A more general solution may be had by denoting the required squares thus; x^2, $x^2 + 4ay$, and $x^2 + 8ay$, then $y^2 + 6ay + a^2$ is to be made a square, assume $= \overline{y+ma}^2 = y^2 + 2may + m^2a^2$, and we shall have $y = \frac{m^2a^2 - a^2}{6a - 2ma} = \frac{m^2a - a}{6 - 2m} = \frac{a.\overline{m^2 - 1}}{6 - 2m}$, where m must evidently be between 1 and 3. If $m = \frac{13}{5}$, and $a = 5$, then $y = 36$, $x = 31$, &c. as above.

Prob. XXXI.

48. To find in whole numbers the three sides of a triangle having one angle $= 120$. *Plate* VI. *Geometry, fig.* 84.

Lemma. When angle B $= 120°$, then $c^2 = a^2 + ab + b^2$. When $\angle$ B $= 60°$, then $c^2 = a^2 - ab + b^2$.

Demonstration. 1. In AB produced, take BD $=$ BC $=$ CD since $\angle$ CBD $= 60°$. Draw the perpendicular CE, then BE $= \frac{1}{2}b = \frac{1}{2}$ BC; but 47 . E . 1 . BE^2 + EC^2 = BC^2, or $\frac{1}{4}b$ + EC$^2 = b^2$, or EC$^2 = \frac{3b^2}{4}$. Now AE $= a + \frac{1}{2}b$, and AE$^2 = a^2 + ab + \frac{1}{4}b^2$ ∴ 47 . E . 1 . AC$^2 = c^2 = a^2 + ab + b^2$.

2. Again; let AD $= a$, &c. as before; then AE $= a - \frac{1}{2}b$, and AE$^2 = a^2 - ab + \frac{1}{4}b^2$; or AC$^2 = c^2 = a^2 - ab + b^2$. Q. E. D.

Cor. 3.—If a, b, c, be the sides of a triangle, and a and b contain an angle of 120°; then $a + b$, b and c are the sides of a triangle, and $a + b$ and b contain an angle of 60° = ADC; and $a + b$, a and c are the sides of a triangle, and $a + b$ and a contain an angle of 60° = CFA.

Cor. 4.—The same is true of any equimultiples of a, b, and c, as ad, bd, cd, &c.

Solution. 1.—Assume any number b for one of the containing sides, and put $x =$ the other; then the square of the third side is $b^2 + bx + x^2$ per lemma.

Assume it $= \overline{a-x}^2 = a^2 - 2ax + x^2$; or $a^2 - 2ax = b^2 + bx$, or $2ax + bx = a^2 - b^2$, and $x = \frac{a^2 - b^2}{2a + b}$. Therefore the three sides are b, $\frac{a^2 - b^2}{2a + b}$, and $a - \frac{a^2 - b^2}{2a + b}$, or $\frac{2ab + b^2}{2a + b}$, $\frac{a^2 - b^2}{2a + b}$, and $\frac{a^2 + ab + b^2}{2a + b}$. Or (48. 4.) $2ab + b^2$, $a^2 - b^2$, and $a^2 + ab + b^2$ are the three sides, all integers.

2. Put $s = a + b$, then $s^2 = a^2 + 2ab + b^2$, and $2ab + b^2 = s^2 - a^2$, and $a^2 + ab + b^2 = s^2 - ab$; whence this

Rule.—Take any numbers, a and b, whose sum is s, then the containing sides are $a^2 - b^2$, and $s^2 - a^2$, and the opposite side is $s^2 - ab$.

Example.—Let $a = 2$, $b = 1$, and $s = 3$, then 3, 5, and 7, are the sides; or by taking the sum of the least sides $3 + 5 = 8$, we have 5, 8, 7, or 3, 8, 7, for the sides of two other triangles, having the angle opposite the side $7 = 60°$.

Moreover, the sum of the squares +, the product of the containing sides, is a square. (per 48.)

Prob. XXXII.

49. To find in whole numbers, three right-angled triangles, having all the same area: the hypothenuse is out of the question.

1. Find (per 48.) the three sides a, b, and c, of a triangle, having the angle opposite $c = 120°$, then of a and c, b and c, and $\overline{a + b}$, &c. form three right-angled triangles (per 21.) and they will all have the same area.

Demonstration. 2. The triangle formed of a and c will have $c^2 - a^2$, and $2ac$ for its sides, and ∴ $ac . \overline{c^2 - a^2}$ for its area. But (per 48.) $c^2 = a^2 + ab + b^2$ ∴ $c^2 - a^2 = ab + b^2 = b . \overline{a + b}$, and $ac . \overline{c^2 - a^2} = acb . \overline{a + b} =$ area of 1st triangle.

3. The sides of the 2d triangle, from b and c, are $c^2 - b^2$ and $2bc$, and its area $bc . \overline{b^2 - c^2}$; but $\overline{c^2 - b^2} = a^2 + ab = a . \overline{a + b}$ ∴ $bc . \overline{c^2 - b^2} = bca . \overline{a + b}$, the same as the area of the 1st triangle.

4. From $\overline{a + b}$ and c the sides are $\overline{a + b}^2 - c^2 = a^2 + 2ab + b^2 - a^2 + ab + b^2 = ab$, and $2c . \overline{a + b}$.

Therefore its area is $abc . \overline{a + b}$, the same as the other two. Q. E. D.

Example.—The numbers in 48. were 3, 5, 7. Of 3 and 7 the triangle is 40 and 42, and area 840. Of 5 and 7 the triangle is 24 and 70, and area 840. Of 8 and 7 the triangle is 15 and 112, and area 840.

Prob. XXXIII.

50. To find three numbers a, b, and c, such that s being their sum $a^2 \pm s$, $b^2 \pm s$, and $c^2 \pm s$, may be all square numbers.

1. The

1. The ſquare of the hypothenuſe $\pm$ the double product of the ſides = a ſquare, but the double product of the ſides = 4 times the area $\therefore$ the ſquare of the hypothenuſe = 4 times the area = a ſquare number.

2. Find, (per 49.) three right-angled triangles having all the ſame area, and let their hypothenuſes be a, b, and c, let $m = 4$ times the common area, and $s = a + b + c$: then $a^2 \pm m$, $b^2 \pm m$, and $c^2 \pm m$, are all ſquare numbers.

3. Aſſume any indeterminate ſquare, as x^2; then $a^2 x^2 \pm m x^2$, $b^2 x^2 \pm m x^2$, and $c^2 x^2 \pm m x^2$ are ſquares. We have only to find ſuch a value of x, that $m x^2$ may be $= a x + b x + c x =$ the ſum of the three numbers: let $m x^2$ be $= a x + b x + c x$: then $x = \frac{a + b + x}{m} = \frac{s}{m}$. Therefore the three numbers $a x$, $b x$, $c x$, are $\frac{a s}{m}$, $\frac{b s}{m}$, and $\frac{c s}{m}$, reſpectively.

Example. 4. The three triangles having the ſame area in 49, are 40, 42, 58 — 24, 70, 74 — and 15, 112, 113 $\therefore a = 58$, $b = 74$, and $c = 113$, $s = 245$, $m = 840.4 = 3360$, and $\frac{s}{m} = \frac{245}{3360} = \frac{49}{672} = \frac{7}{96} \therefore \frac{406}{96}, \frac{518}{96}$, and $\frac{791}{96}$, are the three numbers required: for their ſum is $\frac{1715}{96} = \frac{164640}{9216}$ and $\overline{\frac{406}{96}}\Big|^2 = \frac{164836}{9216}$ and $\frac{164836 \pm 164640}{9216} = \frac{329476}{9216}$ or $\frac{196}{9216}$ the ſquares of $\frac{574}{96}$, or $\frac{14}{96}$, &c.

Prob. XXXIV.

51. To find three ſuch numbers that the ſum or difference of any two of them may be a ſquare.

1. Aſſume $4x$, $4 + x^2$, and $1 + 4x^2$, for the three numbers ſought: then the ſum and difference of the firſt, and each of the others, are ſquares: it remains to make the ſum and difference of the two laſt ſquares. We are to make $5x^2 + 5$, and $3x^2 - 3$, ſquares; their product $15x^4 - 15 = 15 \cdot \overline{x^4 - 1}$ muſt be a ſquare. If $x = 2$, it is $15 \cdot \overline{16 - 1} = 15 \cdot 15$ evidently a ſquare, and the three numbers 8, 8, and 17: the firſt and ſecond the ſame.

2. Put $x = z - 2$, then $15x^4 - 15 = 225 - 480z + 360z^2 - 120z^3 + 15z^4 =$ a ſquare, ſuppoſe $= \overline{15 - az + bz^2}\big|^2 = 225 - 30az + \left.\begin{matrix}30b \\ a^2\end{matrix}\right\} z^2 - 2abz^3 + b^2 z^4$, where it is evident that the co-efficients of the correſponding powers of z muſt be equal, elſe all the terms brought to one ſide could not be $= 0$. From $30a = 480$, we have $a = 16$; from $30b + a^2 = 360$, $30b = 104$; and $b = \frac{52}{15}$, and from $15z^4 - 120z^3 = b^2 z^4 - 2abz^3$, $15z - 120 = b^2 z - 2ab$; $15z - b^2 z = 120 - 2ab$, and $z = \frac{120 - 2ab}{15 - b^2} = \frac{2040}{671}$ $\therefore x = z - 2 = \frac{2040}{671} - \frac{1342}{671} = \frac{698}{671}$. Which, ſubſtituted in the aſſumed expreſſions, gives $4 \cdot \frac{698}{671}$, $4 + \overline{\frac{698}{671}}\Big|^2$, and $1 + 4 \cdot \overline{\frac{698}{671}}\Big|^2 = \frac{2792}{671}$, $\frac{2288168}{\overline{671}|^2}$, and $\frac{2399057}{\overline{671}|^2}$; or, rejecting the common denominator, we have the numbers ſought.

	1873432	
	2399057	
	2288168	
Sum	= 4687225	= □ of 2165.
Difference	= 110889	= □ of 333.
	2288168	
	1873432	
Sum	= 4161600	= □ of 2040.
Difference	= 414736	= □ of 644.
	2399057	
	1873432	
Sum	= 4272489	= □ of 2067.
Difference	= 525625	= □ of 725.

Prob. XXXV.

To find the leaſt biquadratic number, that can be divided into four integral parts, ſuch that the ſum of every two of them may be a ſquare number.

Let n^4 denote the biquadratic number ſought, and a, b, c, and d, its four integral parts, then the queſtion requires, that $a + b = \mu^2$, $a + c = \mu'^2$, $a + d = \mu''^2$, $c + d = \nu^2$, $b + d = \nu'^2$, and $b + c = \nu''^2$. Hence we get $n^4 = a + b + c + d = \mu^2 + \nu^2 = \mu'^2 + \nu'^2 = \mu''^2 + \nu''^2$.

We ſee, therefore, that the biquadratic number ſought muſt be reſolvable into three ſquares, three different ways, and this condition being fulfilled, we derive

$$a = \tfrac{1}{2}(\mu^2 + \mu'^2 - \nu''^2),\ b = \tfrac{1}{2}(\mu^2 + \nu''^2 - \mu'^2)$$
$$c = \tfrac{1}{2}(\mu'^2 + \nu''^2 - \mu^2),\ d = n^4 - \tfrac{1}{2}(\mu^2 + \mu'^2 + \nu''^2),$$

from which formulæ it may be inferred, that the three ſquares μ^2, μ'^2, and ν''^2, muſt either be all even, or two of them muſt be odd and only one even, in order that no fractions may ariſe from the diviſions by 2, and likewiſe that the ſum of every two of them muſt be greater than the third; and, at the ſame time, the ſum of all three leſs than $2n^4$, in order to avoid negative numbers.

It is then neceſſary to find a biquadratic number that may be divided into two ſquares three different ways. We owe to Fermat the curious diſcovery, that every prime number, exceeding a multiple of 4, by unity, or comprehended in the form $4x + 1$, is the ſum of two ſquares; and this property, which is univerſal for prime numbers of the form $4x + 1$, belongs excluſively to that form, ſo that no prime number, which is not of the form $4x + 1$, can poſſibly be the ſum of two ſquares. This curious propoſition was firſt demonſtrated by the celebrated Euler, and to effect the demonſtration, it was neceſſary to prove this other propoſition, *viz.* that every diviſor of a number, which is the ſum of two ſquares that are prime to one another, is likewiſe the ſum of two ſquares. From theſe principles we may eaſily gather, that the biquadratic number, n^4, which we are ſeeking, muſt have prime diviſors of the form $4x + 1$; for if it had none, it could not poſſibly be the ſum of two ſquares and as the leaſt value of n^4 is required, we may ſet aſide all other diviſors; for if n^4 had any other diviſors, theſe could only enter as common meaſures, into every two ſquares that

 compoſe

compoſe n^4. We may, therefore, ſuppoſe n^4, and conſequently n, to have no diviſors, but prime numbers of the form $4x + 1$; and, in the firſt place, let us ſee whether a prime number p, of the form $4x + 1$, will anſwer for n. We have already mentioned, that p is the ſum of two ſquares, $\alpha^2 + \beta$; and we have now to add, that p can be the ſum of two ſquares only one way. In like manner, we find $p^2 = (\alpha^2 + \beta^2)^2 + 4\alpha^2\beta^2$, nor can p^2 be reſolved into two ſquares any other way. Proceeding to the fourth power, we ſhall find $p^4 = (\alpha^4 - 6\alpha^2\beta^2 + \beta^4)^2 + (4\alpha^3\beta - 4\alpha\beta^3)^2$, $p^4 = p^2\alpha^2 + p^2\beta^2$. All theſe two are all the ways that p^4, that be reſolved into two ſquares, therefore no ſingle prime number, of the form $4x + 1$, will anſwer the conditions required. Let us now try the product of two prime numbers of the ſame form as p and p'; then, according to what has been ſhewn, we ſhall have

$$p^4 = (\alpha^4 - 6\alpha^2\beta^2 + \beta^4)^2 + (4\alpha^3\beta - 4\alpha\beta^3)^2,$$

$$p^4 = p^2\alpha^2 + p^2\beta^2; \text{ and in like manner}$$

$$p'^4 = (\alpha'^4 - 6\alpha'^2\beta'^2 + \beta'^4)^2 + (4\alpha'^3\beta'^3 - 4\alpha'\beta'^3)^2,$$

$p'^4 = p'^2\alpha'^2 + p'^2\beta'^2$: therefore, combining the two values of p^4 with the two values of p'^4, the biquadratic $p^4p'^4$ will be the product of the ſums of two ſquares four different ways; but the product of two ſums of two ſquares, is the ſum of two ſquares twice; for $(M^2 + N^2).(P^2 + Q^2) = (MP + NQ)^2 + (MQ - NP)^2 = (MP - NQ)^2 + (MQ + NP)^2$.

Therefore, by combining the two values of p^4 with the two values of p'^4, the biquadratic $p'^4 p^4$ will be the ſum of two ſquares no leſs than eight different ways. To theſe eight we may add four other ways, by combining p^4 with the two values of p'^4, and p'^4 with the two values of p^4. Therefore the fourth power of a number which is the product of two primes of the form $4x + 1$ is the ſum of two ſquares no leſs than twelve different ways.

We ſee then, that no prime number of the form $4x + 1$, can ſatiſfy the conditions required in the queſtion, but a number which is the ſum of two ſuch primes is the ſum of two ſquares twelve different ways, one ſquare of each ſum being even and one odd. Therefore, as every combination of three out of the twelve will give one ſolution of the queſtion, and as twelve numbers admit of 220 combinations of three, there will be ſo many different ſolutions, unleſs ſome are excluded as producing negative numbers. It is eaſy to ſee that one combination of three will only give one integral ſolution.

The two laſt primes of the form $4x + 1$ are 5 and 13, and their product 65, is conſequently the leaſt number that will ſatisfy the queſtion. We have $5 = 2^2 + 1$, and $13 = 3 + 2^2$. Whence

$$65^4 = 3713^2 + 2016^2$$

$$65^4 = 3047^2 + 3696^2$$

$$65^4 = 2145^2 + 3640^2;$$

which are only three of the twelve ways that 65^4 is the ſum of two ſquares. And taking the three even ſquares for μ, μ', and ν'', our formulæ give $a = 1826720$, $b = 2237536$, $c = 11422880$, and $d = 2363489$, which is one ſolution. In like manner, if we take another three of the twelve ways that 65^4 is the ſum of two ſquares, as

$$65^4 = 2047^2 + 3696^2$$

$$65^4 = 2145^2 + 3640^2$$

$$65^4 = 4095^2 + 1040^2$$

we ſhall derive another ſolution; $a = 746208$, $b = 12914208$, $c = 335392$, and $d = 3854817$.

DIOPHANTUS, in *Biography*, a celebrated mathematician and analyſt of Alexandria, who flouriſhed at a period which has not been preciſely aſcertained. According to Abulpharagius, in his "Hiſt. Dynaſt." he flouriſhed under the emperor Julian, or towards the year 366 of the Chriſtian era. It is certain that he could not be later than this time, becauſe the ingenious female Hypatia commented on his work; and it is well known that ſhe flouriſhed towards the commencement of the fifth century. Hypatia alſo commented on the "Canon aſtronomicus," which is juſtly aſcribed to this author. Such was his reputation among the ancients, that they ranked him with Pythagoras and Euclid, in reſpect to mathematical learning. Bachet de Méziriac has collected from Diophantus's epitaph, in the Greek Anthologia, which furniſhes a kind of arithmetical problem, the following particulars of his life: *viz.* that he was married when he was 33 years old, and had a ſon five years after; that this ſon died at the age of 42, and that his father did not ſurvive him above four years: whence it appears, that Diophantus was 84 years of age when he died. The problem amounts to this:—to find a number ſuch that its 6th, 12th, 7th parts with five, its half and four amount to *the whole* number, which is evidently 84. He is ſaid to have been the inventor of algebra, or at leaſt he is the firſt of the Greeks who has written on this ſubject. Although we ſhould not be warranted in aſcribing the invention of algebra to Diophantus, he introduced the uſe of various ſymbols into this ſcience. He denotes the unknown number by στι; its ſquare he called δυναμις or power, and he marked it by δ^{υ}; the cube he called κυβος, and diſtinguiſhed it by κ^{υ}: the biquadrate by $\delta\delta^{\upsilon}$; the fifth power by $\delta\kappa^{\upsilon}$. But the diſcovery which demands our more particular attention was the method adopted by Diophantus, of applying the algebraic analyſis to indeterminate problems. (See the preceding article.) He wrote ſix books of arithmetic, or algebra, which Regiomontanus, in his preface to Alfraganus, informs us, are ſtill preſerved in MS. in the Vatican library. Indeed we learn from Diophantus himſelf, at the cloſe of his addreſs to Dionyſius, prefixed to his work, that it conſiſted of 13 books; whence Regiomontanus might infer that the 13 books were in that library. But no more than ſix books, with part of a ſeventh, have ever been publiſhed; and it may be preſumed that no more are extant. Bombelli, in the preface to his Algebra, written in the year 1572, ſays, that there were but ſix of the books then in the library. Theſe ſix books, with the imperfect ſeventh, were firſt publiſhed at Baſil by Xylander, in the year 1575, in a Latin verſion, with the Greek ſcholia of Maximus Planudes upon the two firſt books, and obſervations of his own. The ſame books were afterwards publiſhed in Greek and Latin at Paris, in 1621, by Bachet, who made a new Latin verſion, and added learned commentaries. He paid ſome regard to Xylander's notes, but treated thoſe of the ſcholiaſt Planudes with the utmoſt contempt. He ſeems to intimate, that the ſix books of Diophantus, now extant, may be merely a collection made by ſome novice of ſuch propoſitions, as he thought proper to ſelect out of the whole 13; but Fabricius thinks that his ſuppoſition is altogether unfounded. M. de Fermat made ſome notes on the edition of Bachet, which was republiſhed by his ſon in 1670. Father de Belli, a jeſuit, publiſhed a work under the title of "Diophantus Redivivus," containing queſtions of more difficult ſolution than thoſe of the ancient analyſt. The ſame ſubject has engaged the attention of Ozanam, Preſtet, Kerſey, M. de Lagni, Frenicle, Wallis, Saunderſon, Euler, Playfair, Ivory, &c.—Montucla, Hiſt. Math. vol. I.

DIOPOLIS, in *Ancient Geography*, a town of Aſia, in Armenia Minor, formerly called *Cabira*, and afterwards *Sebaſte*.

DIOPSIS, in *Entomology*, a genus of the dipterous order of

of infects, generically diftinguifhed by having the eyes placed at the tip of two long filiform immoveable horns, which project from the head, inftead of being feated, as in other infects, within the head itfelf. Of this moft fingular genus we are acquainted with two fpecies; one, the example defcribed by Linnæus, under the fpecific name of Ichneumonea; the other, non-defcript. Linnæus, to whom only the firft fpecies was known, as ufual with him under fuch circumftances, does not affign any fpecific character; the following is taken from Mr. Donovan's fplendid illuftration of the infects of India, in which this extraordinary infect is defcribed at confiderable length, with an appropriate accompaniment of figures.

"*Diopfis Ichneumonea:* nigra capite abdomine antice pedibufque ferrugineis, thorace poftice bifpinofo."—"Black; head, anterior part of the abdomen and legs ferruginous: two fpines on the pofterior extremity of the thorax."—"The appearance of this curious infect is peculiarly ftriking. Nothing can be more fingular than the difpofition of the eyes, which are fituated at the extremity of two long immoveable pedicles arifing from the head, moft exactly in that part which in other infects bears the antennæ. In this particular the diopfis differs not only from other infects of the kindred genera, but alfo from all other kinds we are acquainted with. Some few of the cancri (which Linnæus admits among the infect race) have indeed the eyes placed at the extremity of elongated pedicles, as is for example inftanced in the cancer angulatus; yet thefe are obvioufly diffimilar in conftruction, for they are moveable at the bafe, and may be directed towards any object at the will of the animal with the utmoft facility; but, to accomplifh this, the motion of the pedicle in the diopfis muft be neceffarily accompanied by that of the head, or even of the whole body. The eyes of the latter are notwithftanding fo conveniently ftationed at the globular extremity of the pedicles, as to embrace a far more comprehenfive range of fight than is ufual in the generality of infects.

"To the inexperienced entomologift, the diopfis would rather feem to be furnifhed with remarkable horns, and be deftitute of eyes, although the latter are fo confpicuous when their fituation is pointed out; it is, on the contrary, the true horns or antennæ that are fo minute as to be moft likely to efcape attention, for each of thefe confifts only of a fingle fetaceous hair or briftle feated on a very fmall tubercle juft beneath the eye.

"It has been previoufly intimated that the firft account of the diopfis was given by Linnæus: it is inferted in a fmall tract, publifhed at Upfal in 1775. From this we learn, that the diopfis was firft obferved by Andreas Dahl, among a parcel of infects, in the poffeffion of Dr. Fothergill of London, by whom they were fent to Linnæus. They confifted chiefly of infects collected in North America and Guinea, but the habitat of the diopfis in particular was by no means exactly known. Fuefly, notwithftanding, defcribes the latter upon this ambiguous authority only as a native of Cayenne; and after him, Gmelin notes the fame infect from South America and Guinea, perhaps with as little reafon. Latreille tells us, it is from the coaft of Angola, on the information of Perrin, a zealous naturalift of Bourdeaux. Our fpecimens were brought from Bengal; it was difcovered by Mr. Fichtel, who has thus eftablifhed the habitat of this fingular creature beyond difpute." Vide *Inf. India.*

This infect is rather larger than the common houfe-fly, and is very fcarce.

DIOPTER, or DIOPTRA, in *Writers of Aftronomy*, is frequently ufed for the hole, or index, pierced in the pinnula, or fight of an alhidade. See SIGHTS.

DIOPTRA, among the *Ancients*, an inftrument invented by Hipparchus, which ferved for feveral ufes, as to level water, to take the height of towers, or places at a diftance; to determine the places, magnitudes, and diftances of the ftars.

DIOPTRA, among *Surgeons*, denotes an inftrument whereby to dilate the matrix, or anus, and infpect any ulcers therein; called alfo fpeculum matricis and dilatatorium.

DIOPTRICS (from the Greek διοπτομαι, to fee through) is a branch of the fcience of optics, and treats of the different refractions of light paffing through different mediums, fuch as glafs, water, air, &c.—When the rays of light pafs in an oblique direction from one medium into another, their direction, which is otherwife ftraight, is generally bent at the point of tranfition, and that bending is called the *refraction of light*, the quantity of which differs in different mediums.

In their tranfition from one medium into another, the rays of light, befides their being bent or refracted, fuffer a fort of decompofition, or a feparation of their component parts, whence feveral remarkable phenomena arife. It is the object of dioptrics to ftate and to examine all thefe particulars, together with the various and important ufes to which they are applied. The rain-bow, the colours of thin tranfparent plates, the apparent deviation of the celeftial objects from their true fituations, and various other natural phenomena, arife from the refraction of light; the action of the telefcopes and microfcopes that are conftructed with glafs lenfes, the action of the camera obfcura, of fpectacles, and of lenfes in general, together with that of all the inftruments that contain lenfes, depend entirely upon the refraction of light. However, agreeably to the plan of this dictionary, we fhall only treat of the general theory of dioptrics in the prefent article; but we fhall defcribe the rain-bow, the telefcope, camera obfcura, magic lantern, &c. under the articles of their refpective denominations. When the rays of light pafs obliquely from any tranfparent fubftance into a vacuum, or from the latter into the former, or, in general, from one tranfparent medium into another tranfparent fubftance of different denfity, then they are *refracted* (*viz.* bent) at the point of infertion. But if, inftead of falling obliquely on the furface of any medium, they fall perpendicularly upon it; or if they continue in the fame medium, then they proceed in ftraight lines without any perceptible deviation one way or another. The light of the celeftial objects, in its paffage through the atmofphere to our eyes, has been found to move in curves, which is owing to the various denfities of the air at different diftances from the furface of the earth. The refraction of light may be illuftrated by the following eafy and familiar experiments.

1. Provide a glafs veffel A B C, (*Plate* IV. *Optics*, *fig.* 2.); lay a card, having a fmall hole F in its middle, upon the aperture of it, and fix a candle or lamp E above the veffel, fo that its flame may ftand perpendicularly over the hole F in the card, which may be eafily accomplifhed by means of a plummet. In this fituation of the apparatus the image of the hole will be caft at D, upon the bottom of the veffel; and the line which paffes through the flame E, the hole F, and the image D, will be a ftraight line, as may be determined by holding the plummet on one fide of the veffel. Now, without altering any part of the apparatus, let the glafs veffel A B C be filled with water, which done, it will be found that the image of the hole remains at its original place D; which fhews that the light of the flame E, paffing through the hole F, and falling *perpendicularly* upon the furface W S of the water, proceeds in a ftraight line to D, without fuffering any bending or refraction at the point of its entrance into the water.

2. Take a veffel A B D C, *fig.* 3. open at top, place a lighted

a lighted candle on one fide of it, and a little above the upper edge of it, as at G, and the edge of the fhadow of the fide of the veffel B will be found to fall upon the bottom at E, fo that the line G B D may be a ftraight line. Now, without difturbing any part of the apparatus, let the veffel A B C D be filled with water, and when this has been done you will find that the edge of the fhadow falls at F, *viz.* at a place different from D, which proves beyond a doubt, that the light which falls obliquely upon the furface of the water at B is refracted, *viz.* bent by it; for if it proceeded in a ftraight line, G B F would coincide with G B D, which is by no means the cafe.

3. An eafier way of fhewing this remarkable property of light is as follows. Place a piece of money D, *fig.* 4. in the bottom of a common empty bafon, and let a perfon fituate his eye at F; *viz.* at a place whence he may juft fee the piece of money D along the edge B of the veffel. In this cafe the line F B D is a ftraight line, becaufe the light from the piece of money D to the eye at F paffes entirely through air. Now let the obferver place his eye a little below F, as at G, and from this latter place he will not be able to fee the piece of money; but if in this difpofition of the apparatus, eye, &c. the bafon be filled with water, the eye at G will immediately perceive the piece of money; for the ray of light D B, in paffing from the water into the air at B is bent, *viz.* refracted into the direction B G.

At the point B of *fig.* 3. raife B K perpendicular to the furface of the water, and let the line B I be a prolongation of that furface, or an horizontal line. Then the ray of light G B, which falls upon the furface of the water at B, is called the *incident ray;* that part of it B F, which after the bending at B, paffes through the water, is the *refracted ray;* the water, or any other tranfparent fubftance, which produces a fimilar effect, is called the *refracting medium;* the angle which the incident ray G B makes with the perpendicular to the furface at the point of incidence B; *viz.* the angle G B K is the angle of incidence, the angle which the refracted ray makes with the fame perpendicular produced; *viz.* the angle G B F, is the angle of refraction. But fome authors call G B I the angle of incidence; and F B A, the angle of refraction; which are the angles made by the incident and the refracted rays, with the furface or horizontal line A B I.

Inftead of water, the veffel A B D C, *fig.* 3. may be filled with oil, or with fpirit of wine, or with a lump of glafs, or in fhort with any other tranfparent medium different from air, and the ray of light G B will always be bent; with this difference, however, that the ray will be bent, *viz.* refracted, more or lefs according as one tranfparent medium or another is employed; which fhews that every tranfparent fubftance has a peculiar degree of refracting power. And accordingly if the experiment be fucceffively repeated with different refracting mediums, and the place of the edge of the fhadow on the bottom of the veffel, be marked at each experiment; then from the diftances of thofe places, or marks from the point C, the refpective refractive powers of the tranfparent fubftances that have been employed, may be determined. As a matter not of mere curiofity, but of very great ufe in the conftruction of optical inftruments, as well as in the inveftigation of natural phenomena, thefe different refractive powers of tranfparent fubftances, have been attentively determined by various able philofophers. A lift of thofe powers as belonging to different fubftances, together with the beft methods of afcertaining them, will be found under the article Refraction.

A remarkable property has been obferved with refpect to the refractive power of tranfparent fubftances, which is that in the fame fubftance the fine of the angle of refraction always bears the fame proportion (either precifely or very nearly) to the fine of the angle of incidence. This requires illuftration by means of a diagram. Let F G H Z (*fig.* 5.) be a quantity of water; B is a narrow tube through which the fun fhines obliquely upon the water at C. Then, on account of the refractive property of water, that light will not pafs through the water along the line C Z, which is in the fame ftraight direction with B C; but it will pafs in the direction C D; making the angle of refraction D C E, with the line A C E (which is perpendicular to the furface of the water, or to the boundary of the two mediums, *viz.* water and air) fmaller than the angle of incidence A C B. Let a circle F H E be defcribed about the centre or point of incidence C, in the fame plane with the lines B C, C D; and from the interfection H of the circle with the incident ray, let a perpendicular H K be dropped on the line A E; then H K is the fine of the angle B C A. Alfo, if from the interfection I of the circle with the refracted ray, a perpendicular I L be dropped on the fame line A E, then I L will be the fine of the angle D C E.

Now it has been found that the fine I L is always nearly three-fourths of the fine H K, let that fine be what it may; for inftance, if the tube B be placed at M, then O R will be the fine of the angle of incidence M C A; and Y Q will be the fine of the angle of refraction, or of the angle in water Y C E. And in this cafe it will be found, as above, that the fine Y Q is nearly three-fourths of the fine O R.

It is evident, that when the incident ray comes along the line A C, the angle of incidence, as well as its fine, vanifhes or becomes nothing; confequently, the angle of refraction and its fine, muft vanifh too; *viz.* the ray of light muft proceed ftraight along the line A C E; hence it is faid that there is no refraction when the rays of light enter a medium in a direction perpendicular to its furface.

If inftead of water, F G H Z be fuppofed to be a lump of glafs, every thing elfe remaining as above; then the difference in the refult would be, that the ratio of the fine of refraction to that of incidence would be that of 2 to 3; (inftead of being that of 3 to 4, which is the cafe with water) *viz.* the angles of refraction will be refpectively fmaller when F G H Z is glafs than when it is water. And if inftead of water or glafs, F G H Z were a diamond, then the angle of refraction would be fmaller ftill; *viz.* the fine of the angle of refraction in the diamond would be to the fine of the angle of incidence in the air, nearly as 2 to 5. Hence it appears, that the power of bending or refracting the rays of light is ftronger in glafs than in water, and ftronger in diamond than in glafs. See the article Refraction. The refractive property of tranfparent fubftances, and efpecially of fluids, is increafed a little, when their temperature is raifed. Two other remarkable phenomena accompany the refraction of light, the firft of which is that the light is not only bent whenever it paffes obliquely from one medium into another of different denfity, but is likewife enlarged in a fectoral, or fan-like, manner. The fecond is that this enlarged part of the refracted light is tinged with the colours of the rainbow. In *fig.* 6, I C reprefents a fmall beam of folar light, which paffes through the air, and enters another refracting medium at C. There the beam of light is refracted, *viz.* is diverted from its ftraight line direction I C, and is fpread, or difperfed, into the fectoral fhape *v* C *r*, which is called *the angle of difperfion*, or *of diffipation*, and which is itfelf divided into fmaller fectors of different colours; *viz.* next to the upper line C *r*, the light appears red, and thence it gradually degenerates into orange, then yellow, green, blue

blue, indigo, and laftly violet, which ftands neareft to the lower line or boundary C v. This difperfion of the beam of light is in the fame plane with the incident and the refracted ray I C m. The line C m, drawn through the middle of the angle of difperfion v C r, is the mean direction of the refracted light, and $m\,e$ is its fine, which is called *the fine of the mean angle of refraction* : $v\,f$, and $r\,d$, are the fines of the extremes; $v\,f$ being called *the fine of the moft refrangible colour, viz.* of the violet, and $r\,d$, *the fine of the leaft refrangible colour*, which is the red. This feparation of the white, or colourlefs light, into various colours, juftly induced fir Ifaac Newton to conclude, that white light confifts, or is a mixture, of differently coloured rays, which, being differently refrangible, are of courfe feparated by the refracting medium.

Through the fame refracting medium the angle of difperfion is always proportionate to the mean angle of refraction; confequently when the mean angle of refraction is very fmall, then the angle of diffipation muft be comparatively much fmaller, in which cafe the different colours of the refracted light cannot be difcerned; but when the angle of incidence, and of courfe the mean angle of refraction, is confiderably large, then the angle of diffipation will be fo large as to exhibit the different colours. In order to render this coloured difperfion of light as apparent as poffible, philofophers generally receive the light, either of the fun or of any other luminous object, upon the fide of a prifmatic lump of glafs; for in that cafe the light, entering into and going out of the prifm with a great angle of inclination, its refraction and its difperfion become very great; confequently its colours, or as it is commonly called, *the prifmatic fpectrum*, is broad and vivid. Hence the above-mentioned colours, or the component coloured rays of white light, have likewife been called *the prifmatic colours*. See Prismatic *Colours*.

Different refractive mediums have different difperfive powers; for inftance, the angle of incidence I C H, *fig.* 6. remaining the fame, not only the mean angle of refraction m C E will vary according as the refractive medium A B D G is water, or glafs, or oil, or other tranfparent fubftance; but the angle of diffipation v C r will alfo vary. And in fome refracting mediums the mean angle of refraction is larger, whilft the angle of difperfion is fmaller. In other refracting mediums the mean angle of refraction is fmaller, whilft the angle of difperfion is larger. In fhort the knowledge of the mean refractive power of any given fubftance, will not enable us to determine the precife quantity of its difperfive power, and *vice verfâ*. Therefore, in each particular tranfparent fubftance, both its refractive and its difperfive properties muft be afcertained by means of actual experiments.

There is a remarkable fort of tranfparent mineral bodies, which have the fingular property of refracting the light in a double, and even in a multiple, direction; fo that an object, feen through a plane plate of the tranfparent mineral, will appear double, and fometimes even treble and quadruple. Rock cryftal, and efpecially the Iceland cryftal, befides a few other bodies, are poffeffed of this double, or even multiple refractive power.

A lift of the difperfive powers of various tranfparent fubftances will be found annexed to the lift of refractive powers, under the articles Refraction, and Dispersion, to which we refer our readers. We fhall, however, here add a few ufeful and general remarks on refraction, &c.

Upon the whole it appears, that the denfer bodies; *viz.* thofe which have a greater fpecific gravity, refract, or bend, the rays of light, more than thofe which are lefs denfe; excepting (as fir Ifaac Newton expreffes it) that unctuous and fulphurous bodies refract more than others of the fame denfity. There is no fubftance that has an intermediate refractive power between air and rain water, or diftilled water. The refractive power of the diamond exceeds that of any other known fubftance, and to this property its peculiar brilliancy, when properly fhaped, is in great meafure to be attributed. Spirituous liquors have a greater refractive power in proportion to their ftrength. Spirit of turpentine is the moft refractive amongft the fluids.

The above-mentioned properties of tranfparent bodies, or of light, or of both, however trifling they may appear to the novice in philofophy, have proved extremely ufeful to the human fpecies. Sir Ifaac Newton, who firft paid particular attention, and made feveral important difcoveries relative to the coloured rays of white light, had no fufpicion of the laft above-mentioned property of tranfparent fubftances. He thought that the difperfive power was conftantly proportionate to the refractive. Experiments made fubfequent to his, have fhewn, that the fact is otherwife; fo much fo, that even glaffes formed of different materials, or of the fame ingredients in different proportions, are poffeffed of different difperfive powers with the fame refractive property, or of different refractive powers, and an equal difperfive property. By a combination of lenfes confifting of different kinds of glafs, the famous Dollond formed his achromatic object lenfes of telefcopes; whence thofe optical inftruments received a moft capital improvement; the nature of which may be briefly pointed out in this place, whilft the detail of particulars will be found under the articles Achromatic, and Lenses.

A glafs lens, fuch as is ufed for telefcopes, bends the rays of light towards a particular point or fmall fpot, which is called its *focus*; but this bending of the rays of light is accompanied with a decompofition of the fame into their coloured component rays; therefore, the magnifying powers of the lenfes of the old telefcopes were always attended with tints of the various prifmatic colours, which became more apparent in proportion as the magnifying power was greater, under a given length of telefcope; hence thofe telefcopes could not be made to magnify the object beyond a very moderate degree: nor could their object lenfes have a large aperture. But Mr. Dollond formed each object lens by placing two, or three lenfes, clofe to each other, which were made of different forts of glafs, and fuch as the difperfive and refractive powers of one of them, fhould counteract the difperfive and refractive powers of the other; whence the compound lens might produce the effect of bending the rays of light to a focus, and at the fame time not decompofe them into their coloured parts. And from this effect the achromatic lenfes, or the achromatic telefcopes, have derived their diftinctive appellation. This fort of telefcope, then, has a vaft advantage over thofe of the old conftruction; for fince the effect of its object lens is not tinged with colours, the power of the telefcope may be increafed to a confiderable degree, and its object lens may be made confiderably larger, in confequence of which the inftrument will reprefent the objects very bright. In fact, a modern achromatic telefcope of about four feet in length, and properly conftructed, may be reckoned about equal in effect to a forty feet telefcope of the old conftruction.

We might now proceed to explain feveral natural phenomena, as alfo the nature and the effects of glafs lenfes, of prifms, of telefcopes with lenfes, and various other optical inftruments, which undoubtedly belong to the dioptric branch of optics, but it has already been mentioned, that thefe will be found defcribed under the articles of their particular names.

Dioptric *Telescope*, is a telescope through which the light passes directly from the object to the eye of the observer. See Dioptrics.

Towards the close of the 16th century, the wonderful discovery of the telescope was accidentally made by placing two glass lenses at the two extremities of a tube, and looking through it. This discovery was no sooner made, than the ingenuity of philosophers began to vary and to improve the construction, in order to render the instrument as powerful as possible, and to adapt it to the numerous purposes which it was justly thought capable of answering. But it being found that telescopes of this kind had a very limited power on account of the dispersive power of the lenses, and which at that time was looked upon as an unsurmountable obstacle, (see Dioptrics) sir Isaac Newton first constructed a telescope, which instead of an object glass lens, had a reflector; whence the rays of light, instead of being *refracted* to a focus, were *reflected* to a focus; and this latter case was not attended with a dispersion of the light into its coloured component rays, whence Newton's contrivance was thought capable of a much greater magnifying power, and altogether capable of greater improvements; which, in fact, has been verified through the assiduous exertions of philosophers and artists. This contrivance introduced the different denominations of the *refracting* or *dioptric* telescope, and of the *reflecting* or *catadioptric* telescope. The former of these two kinds, which constitutes the object of the present article, consists entirely of lenses fixed in a tube or tubes; but the form, the number, and disposition of those lenses, has been much varied in order to render the instrument subservient to different purposes. And according to its various constructions, and its various uses, the dioptric telescope has obtained various particular appellations, which we shall briefly enumerate in this place; for their peculiar constructions, their powers, uses, &c. will be found minutely described under the articles of their particular denominations.

The *astronomical* telescope consists of two, either single or compound, lenses. It represents the objects inverted, and is principally used for observing the celestial bodies. When this sort of telescope is very long, the two lenses are connected together not by a tube, but by a string or pole, and in that case it is called an *aerial* telescope.

By adding two or more convex lenses to the eye tube of the astronomical telescope, that instrument is enabled to represent the objects erect, in which case it may more particularly be used for viewing land objects; whence it has been called a *perspective glass*, or the *terrestrial* telescope.

The *Galilean* telescope, contrived by the great Galileo, consists of two lenses; but the eye lens is a concave one. It represents the object erect, and peculiarly distinct; but its field of view is small, in comparison with the astronomical telescope of an equal magnifying power.

The common *opera glass* is nothing more than a very short Galilean telescope. It magnifies little, but it shews the objects erect and much illumined; hence it is mostly used in places wherein the objects are rather obscure.

The *night* telescope is a short telescope, of about two feet in length, and often shorter. It represents the objects inverted, but much illumined; though little magnified. Its field of view is very extensive; hence it is used mostly or entirely in the night time either by navigators or by astronomers; the former using it for discovering objects that are not very distant, but which cannot otherwise be discerned for want of sufficient light, such as vessels, coasts, rocks, &c.; and the latter for discovering comets, or other not very luminous objects.

Almost all these different telescopes are often constructed with an achromatic object lens; in which case the epithet *achromatic* is annexed to their peculiar appellations.

DIORDULI, in *Ancient Geography*, a people placed by Ptolemy in the eastern part of the island of Taprobana.

DIORPHUS, a mountain of Asia, in Armenia, near the Araxes, according to Plutarch.

DIORTHOSIS, διορθωσις, in *Surgery*, an operation, by which crooked or distorted members are made even, and restored to their primitive and regular shape.

DIORYX, in *Ancient Geography*, a canton of Asia, in Assyria, near the Tigris.

DIOSANTHUS, in *Botany*, Διος ανθος of Dioscorides, book vi. chap. 6, is merely enumerated by him among the coronary or ornamental plants, without any description, except its being without scent. Hence it does not very clearly appear why some commentators have supposed this flower to be the Carnation, or Clove Pink, though others may be more correct who take it for the Sweet William. Linnæus, however, has adopted the name, a little changed, for his genus; to which both these plants belong. See Dianthus.

DIOSCOREA, (so called by Plumier after the Greek botanist Pedacius Dioscorides.) The Yam. Plum. Gen. 9. t. 26. Linn. Gen. 525. Schreb. 693. Mart. Mill. Dict. v. 2. Juss. 42. Gærtn. t. 17. Class and order, *Dioecia Hexandria*. Nat. Ord. *Sarmentaceæ*, Linn. *Asparagi*, Juss.

Gen. Ch. Barren fl. *Cal.* Perianth of one bell-shaped leaf, in six deep, oblong segments, spreading at their extremities; the three innermost smallest. *Cor.* none, except the calyx be taken for such. *Stam.* Filaments six, awl-shaped, very short, opposite to the segments of the calyx; anthers of two distant lobes. Fertile fl. *Cal.* as in the barren ones. *Cor.* none. *Pist.* Germen minute, triangular, inferior; styles three, undivided; stigmas simple. *Peric.* Capsule large, three-lobed, with three cells, and three heart-shaped, compressed valves. *Seeds* two in each cell, imbricated, roundish, with a membranous border.

Eff. Ch. Barren fl. Calyx in six deep segments. Corolla none. Fertile fl. Cal. in six deep segments. Cor. none. Styles three. Capsule inferior, three-lobed, and three-celled, compressed. Seeds two in each cell, bordered.

Obs. The capsule is justly represented inferior in the Hortus Malabaricus, though Linnæus, Jussieu, and Gærtner thought it superior.

Of this genus about 20 species are more or less perfectly known, their synonyms being greatly confused. We are not at present furnished with materials to elucidate them, for the plants being not very dissimular in appearance, nor remarkable for beauty, they have been but little attended to by collectors. Their *roots* are generally tuberous, perennial, esculent when boiled. *Stems* annual, twining, weak. *Leaves* mostly alternate, stalked, heart-shaped, entire, with numerous simple ribs. *Flowers* in simple or branched clusters, small, greenish-white. Tuberous buds, which become roots, are frequently produced on the stem above the insertion of the foot-stalks. D. *sativa*, Linn. Sp. Pl. 1463. Hort. Cliff. t. 28, is generally taken for the Yam, and is certainly cultivated as such in the warmer parts of America. But Forster, in his Plantæ Esculentæ 56, says D. *alata*, Linn. Sp. Pl. 1462, is the most universally cultivated in both East and West Indies, the equinoctial part of Africa, and in the islands of the South Sea, its roots being no less grateful than wholesome, when either boiled or roasted, and used as bread. This is the *Katsjil Kelengû* of Hort. Mal. v. 7. t. 38; and, according to Forster, the different species of *Ubium* in Rumph. Herb. Amboin. v. 6. book 9. t. 120.

to 123, and 125, referred by Linnæus to his D. *oppositifolia*, belong to the *alata*. The same author informs us "the root is often three feet long, as thick as a man's thigh, and weighs 30lb. Its bark is black, the internal part white and glutinous, becoming farinaceous when drest. The juice, when recent, is acrid, causing itching in the skin. A favourite dish in Otaheite is composed of this root, with pulp of the *Musa*, or Plantain-fruit, and grated cocoa-nuts." D. *bulbifera*, Linn. Sp. Pl. 1463. Salisb. Parad. t. 17. (Katu Katsjil; Hort. Mal. v. 7. 69. t. 36.) A native of shady woods in Malabar, is not mentioned by Rheede as an esculent plant, but the boiled root, mixed with powder of China-root, is used as an application to cleanse and heal ulcers.

DIOSCORIDES, Pedacius, or Pedanius, in *Biography*, a celebrated Greek physician and botanist of Anazarba in Cilicia, now Caramania, who lived, as it is generally thought, in the time of Nero. He is said to have been originally a soldier, but he soon became eminent as a physician, and travelled much, both in Europe and Asia, for the purpose of acquiring knowledge. He paid particular attention to the Materia Medica, and especially to Botany, as subservient to Medicine. His knowledge of plants has been reckoned superior to that of any other ancient writer; but Theophrastus must always be excepted as by far the more philosophical botanist, and one by whose information Dioscorides profited, as Pliny subsequently did by them both.

Dioscorides has left us a treatise on the Materia Medica, in five books, of which the beginning of the second speaks of animal substances, the rest entirely of plants; also two books on the composition and application of medicines, an essay on counter-poisons, and another on venomous animals. The best edition of his works was published in one volume folio, at Lyons in 1598, in the original Greek, with a Latin version and notes by Saracenus, or Saracin, a physician of that place. Aldus, however, had already published a Greek edition of Dioscorides in 1495, and a Latin one had appeared at Cologne in 1478. His commentators have been numerous, but the most celebrated and valuable of them all is Matthiolus, whose numerous editions, illustrated with wooden cuts, are, some or other of them, essential to every botanical library. The finest of these, on account of the large size of the figures, were published in folio by Valgrisius at Venice, in Italian in 1565, and in Latin in 1583 and 1604. Linnæus used a smaller Latin edition of 1570 by the same printer, with cuts of the size usual in the works of Clusius, Gerarde, &c. Dioscorides describes or mentions about 600 plants, but his descriptions are often so slight and superficial, founded on such uncertain or variable characters, and so devoid of technical or systematical principles, that his commentators had ample scope for conjecture, and their controversies with each other were, as Haller observes, terminated only by despair of success. So vague were their conjectures in many instances, that not only the extremities of Europe, but even America, was ransacked to explain a Greek plant. This has been a fertile source of error. Some good botanists have taken a more sure way of ascertaining the plants of Dioscorides and Theophrastus, by seeking them in the countries where they were originally described. Among these travelling botanists, Tournefort and the late Dr. John Sibthorp, Professor of Botany at Oxford, will ever stand pre-eminent. The latter has determined some of the most celebrated Greek medical plants, hitherto mistaken or unknown, as the φου and ελλεβορος μελας of Dioscorides, the former of which proves a hitherto unknown species of Valerian, *Valeriana Dioscoridis*, Fl. Græc. t. 33, and the latter a new *Helleborus*, intermediate, as it were, between the *niger* and *viridis* of Linnæus. Even amongst the shepherds of the present day, Dr. Sibthorp met with traditionary accounts of the virtues of some plants handed down from the ancients. A root of the απιος, *Euphorbia Apios*, Linn., being shewn to a Cretan peasant, the Professor was assured by him that the upper part was emetic, the lower purgative, exactly as Dioscorides relates. Several manuscripts of this author's works with figures are extant, which have often been cited by his commentators. Of these the most celebrated is in the Imperial library at Vienna, the figures of which were partly engraved in the reign of the empress Maria Theresa, under the inspection of Jacquin. Two impressions only of these plates, as far as we can learn, have ever been taken off, as the work was not prosecuted. Of these one was sent to Linnæus, with notes by Jacquin, and is now in the hands of the writer of this account; the other was given, out of Professor Jacquin's own library, to Dr. Sibthorp, to assist his enquiries in Greece, and remains at Oxford. The Linnæan copy consists of 142 plates, in oblong quarto, in alphabetical order, beginning with the αριστολοχια μακρα, and ending with ευζωμον, a kind of wild rocket or radish. Nothing can be more rude than these figures, except those of Cuba and Dorstenius, and they scarcely afford any information that is not familiar to botanists versed in the subject. Haller asserts, that perhaps a third part of the plants of Dioscorides is still unknown, and it is to be feared they will never be entirely determined. The enquiry, indeed, at present, is rather a matter of curiosity than of any considerable medical importance. The remarks of this great Swiss botanist on the botany of the ancient Greeks, are too just and striking to be omitted here. "That ingenious people," says he, "were not formed for the slow and patient contemplation of nature. They noticed the most prominent points of their subject, but neither entered into the number of the parts of plants, nor their dimensions, nor did they accurately define their forms. They scarcely sought for any thing but plants useful in medicine, or necessary for some economical purposes. Yet they were not altogether ignorant of the importance of generic distinctions, for Dioscorides adverts to several species of *Geranium*, and several of *Ranunculus*. The Greeks have by no means exhausted the vast treasures of nature which they might have obtained if they had examined, with equal care, the frozen regions of the Olympus and the warm isles of the Archipelago. We must therefore in justice allow, that the botanical learning of the people in question is no more to be compared with that of modern Europe, than with the industry of the Chinese, Japanese, or Hindus. It is proper, nevertheless, to read the Greek authors, as the reputed virtues of plants have descended from them to us, with but little variation." Diosc. Op. Haller Bibl. Bot. S.

DIOSCORON, or Dioscurum, in *Ancient Geography*, an island placed by Pliny on the coast of Magna Græcia, over-against the promontory Pacinium.

DIOSCURIA, διοσκουρια, from Διος, *Jupiter*, and κουροι, *infants*, in *Antiquity*, a festival in honour of the Διοσκουροι, or Castor and Pollux, who were reputed to be the sons of Jupiter. It was observed by the Cyrenæans, but more especially by the Spartans, whose country was honoured by the birth of these heroes. The solemnity was full of mirth, being a time wherein they shared plentifully of the gifts of Bacchus, and diverted themselves with sports, of which wrestling matches always made a part. Potter, Archæol. Græc. lib. ii. cap. 20. tom. i. p. 384.

DIOSCURIAS, in *Ancient Geography*, a town of Asia, situated on the N.E. coast of the Euxine sea, that is, in the territory of Colchis. It was anciently called *Æa*, and, in process of time, *Sebastopolis*. It was established, according to Arrian, by a colony of Milesians. P. Mela says, that it was founded by Castor and Pollux, who made a voyage to Colchis

Colchis with Jafon. It muft have taken the name Sebafto-polis, denoting the town of Auguftus, under the emperor, A great part of the commerce of the Euxine fea centered in this town. It is now in ruins, under the name of *Sebaftopoli*.

DIOSCURIUM, a town of the Peloponnefus, in Phlafia, according to Polybius.

DIOS-GYS, in *Geography*, a town of Hungary; 32 miles W. of Tokay.

DIOS-HIERON, or *Temple of Jupiter*, in *Ancient Geography*, a town of Afia Minor, in Ionia, fituated at a fmall diftance from the fea, between Lebedus and Colophone. It was confecrated to Jupiter.

DIOSMA, in *Botany*, (fo named by Linnæus from δις, διος, *Jove*, and οσμη *a fmell*, on account of its "divine odour," which in the *Diofma hirfuta* he compares to that of the ftarry anife, or *Illicium anifatum*; fee Hort. Cliff. 71. Nothing, however, can lefs deferve the epithet of divine than the fcent of fome fpecies, which makes the favourite perfume of the Hottentots, and approaches to that of rue and others of the fame natural order with this genus.) Linn. Gen. 108. Schreb. 148. Willd. Sp. Pl. v. 1. 1133. Juff. 298. Gærtn. t. 94. (Hartogia; Linn. Gen. 108.) Clafs and order, *Pentandria Monogynia*. Nat. ord. *Multifiliquæ*, Linn. though referred by him, *Hartogia* at leaft, to his *Aggregatæ*, from whence he fubfequently erafed it. *Rutaceæ*, Juff. next to *Dictamnus*, though placed by that author in a feparate fection, the natural order in queftion being at the time not well underftood.

Gen. Ch. *Cal.* Perianth in five deep, ovate, acute, permanent fegments. *Cor.* Petals five, elliptic-oblong, bluntifh, feffile, flightly fpreading. *Nectary* five fcales crowning the germen. *Stam.* Filaments five, awl-fhaped; anthers fomewhat ovate, incumbent. *Pift.* Germen fuperior, turbinate, with three or five angles, crowned with the nectary; ftyle fimple, erect, the length of the ftamens; ftigma fmall, obtufe. *Peric.* Capfules three or five, connected by their inner edge, ovate, pointed, compreffed; their fummits fpreading; opening at the upper margin. *Seeds* folitary, oblong, polifhed, enclofed in an elaftic *arillus* of two valves.

Eff. Ch. Petals five. Nectary five fcales crowning the germen. Filaments fimple. Capfules three or five, connected. Seeds in an elaftic bivalve arillus.

Obf. From this genus are now neceffarily feparated the D. *uniflora* and *unicapfularis* of Linnæus, the former being an *Erioftemon*, the latter an *Empleurum*; fee thefe genera. Hence the polymorphous character of *Diofma*, alluded to by Linnæus in his Syftema Vegetabilium, is in a great meafure obviated.

Willdenow defines 30 fpecies of *Diofma*, all natives of the Cape of Good Hope or the adjoining country, and all fhrubs of a moderate fize, much branched with fimple leaves, moftly entire, fometimes elegantly crenate; their form awl-fhaped or linear, rarely elliptical or heart-fhaped. The whole plant always abounds with pellucid glandular dots, the feat of a ftrong-fcented effential oil. Some few have ciliated leaves and calyx, but the general habit is fmooth. The flowers are white or reddifh, commonly handfome, and fometimes fweet-fcented.

Nine fpecies are enumerated in the Hortus Kewenfis, but fome others have been brought into the Englifh gardens fince that work appeared. D. *hirfuta* is one of the oldeft fpecies. D. *ferratifolia*, Curt. Mag. v. 13. t. 456, is a new and elegant one, faid to come from New South Wales, which is not improbable, as that country produces more genera of this natural order than any hitherto examined. The fhrub in queftion is very near the *crenata* of Linnæus, which laft, with D. *pulchella* and *ericoides*, are faid to be principally ufed by the Hottentots, and called by them Bucku. The leaves are dried and powdered, and when mixed with greafe ferve to anoint the bodies of thofe people, whofe odour proved as difagreeable to profeffor Thunberg, as our more refined European pomatums frequently are to thofe not accuftomed to them, efpecially fince more cleanly habits have brought them into difufe.

Diosma, in *Gardening*, comprehends plants of the low growing fhrubby exotic kinds; of which the fpecies moftly cultivated are the oppofite-leaved diofma (D. *oppofitifolia*); the hairy-leaved diofma (D. *hirfuta*); the red-flowered diofma (D. *rubra*); and the heath-like fweet-fcented diofma (D. *ericoides*.)

Method of Culture.—Thefe are plants which are capable of being increafed by planting out the cuttings of the young fhoots in the fpring or fummer feafons, in pots filled with good mould, plunging them in a moderate hot-bed. After the plants have ftricken good roots, they fhould be carefully taken up and placed out feparately in pots, proper watering and fhade being afforded; and they afterwards require to be protected from the effects of bad weather in the green-houfe, and to have the management of other fhrubby exotic plants of a fimilar low fhrubby growth.

The great beauty of the bloom, and the fragrant fmell of many of thefe plants, particularly entitle them to places in collections of the fhrub kind.

DIOS-OROS, or Jovis mons, in *Ancient Geography*, a mountain of Africa Propria. Ptol.

DIOS-PAGE, a town of Afia, in Mefopotamia. Pliny.

DIOSPOLIS, a town of Afia, in Syria. Pliny places it near the town of Laodicea, on the fea; Strabo places it in Phrygia. It is the fame town with Laodicea on the Lycus, and is called alfo Rhoas and Laodicea.—Alfo, a town of Upper Egypt, called *Diofpolis-magna*, the fame with *Thebes*; which fee.—Alfo, an epifcopal town of Egypt, in the fecond Thebaid, diftinguifhed by the epithet *little*, or *Diofpolis parva*. (See Girge.)—Alfo, a town of Egypt, in the Delta, near Mendes, according to Strabo, and placed by Suidas in the nome of Bufiris.—Alfo, a town of Afia Minor, in Bithynia, on the coaft of the Euxine fea. Ptol.—Alfo, a town of Arabia, afterwards called *Berytos*. Steph. Byz.—Alfo, an epifcopal town of Thrace.—Alfo, a town of Paleftine, called *Lydda*; fituated on an extenfive plain, reaching from E. to W. from the Mediterranean to the mountains of Judæa, feven or eight leagues, and much more from S. to N. It was three miles from the town of Ramleh. The Itinerary of Antonine places it 32 miles from Jerufalem, and 36 miles from Cæfarea. This place is mentioned under the name of Lydda in the facred writings; and anciently formed part of the kingdom of Ifrael, or Samaria, according to the 1ft book of the Maccabees, ch. ii. v. 34. Mention is made of this town in the hiftory of Pompey's expedition in Judæa. It fuffered much during the civil wars of the fecond triumvirate: Caffius, when he was in the Eaft, expofed its inhabitants to public fale; but Marc Antony, by a decree, reftored their liberty, and re-eftablifhed them in their country. Jofeph. Antiq. lxiv. c. 18. The town of Lydda was burnt by Ceftius Gallus, A. D. 66, when he went at the head of a powerful army to the fuccour of king Agrippa. Pliny reckons it among the prefectures of Judæa, and Ptolemy places it in the number of the towns of that country. When Paleftine was divided into three provinces under the reign of Arcadius, the town of Diofpolis continued under the metropolis of Cæfarea.

DIOSPONTUM, a place of Afia, in the fecond Armenia,

nia, lying to the weſt of the Euphrates and the ſouth of Meias.

DIOSPORON, in *Botany*, (from δις, διος, *Jupiter*, and σποϱος, a *ſeed*,) has ſometimes been uſed as a name for the Gromwell, or *Lithoſpermum officinale*, otherwiſe called by old writers *Milium Solis*. Theſe ancient names probably allude to the brilliancy and beauty of the ſeed, as the Linnæan appellation expreſſes its ſtony hardneſs. Pliny ſays ſome call it *Dioſ-pyron*. See Diospyros.

DIOSPYROS, (from δις, διος, *Jupiter*, and either πυϱ, a *fire*, or *flame*, or elſe πυϱος, *wheat*. The latter is the opinion of Linnæus, the former of ſome commentators on Theophraſtus. The application of either is, in the preſent caſe, unintelligible. We have often ſuſpected that the Italian botaniſts of the 16th century, who firſt applied this name to the preſent genus, underſtood it as a jumble of Greek and Latin, *pyrus*, a pear, being not very unſuitable to the fruit in queſtion.) Date-plum, or Perſimon. Linn. Gen. 550. Schreb. 736. Juſſ. 156. Gærtn. t. 179. (Guaiacana; Tourn. t. 371.) Claſs and order, *Polygamia Diœcia*, or rather *Octandria Monogynia*. Nat. Ord. *Guaiacanæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, in four, ſometimes five or ſix, deep, obtuſe, permanent, and finally enlarged ſegments. *Cor.* of one petal, urceolate, larger than the calyx, four-cleft; its ſegments acute and ſpreading. *Stam.* Filaments eight, (in D. *virginiana*, 16 in two rows), awl-ſhaped, ſhort, firmly fixed in the receptacle; anthers oblong, acute, in moſt flowers ineffectual. *Piſt.* Germen ſuperior, roundiſh; ſtyle one, divided half-way down into four parts, permanent, longer than the ſtamens; ſtigmas obtuſe, cloven. *Peric.* Berry large, globoſe, with eight cells, (or rather from ſix to twelve), ſeated on the enlarged ſpreading calyx. *Seeds* ſolitary, roundiſh, compreſſed, very hard. Male flowers on a ſeparate plant, with a ſmall, acute, upright *calyx*; a ſquare, urceolate, coriaceous *corolla*, whoſe ſegments are revolute; long, acute, twin *anthers*, the innermoſt ſmalleſt; and only the rudiment of a *germen*.

Eſſ. Ch. Calyx four-cleft. Corolla urceolate, four-cleft. Style four-cleft. Stamens eight or 16. Berry with eight ſeeds. Male flowers on a ſeparate plant.

Obſ. This genus is very nearly related to *Royena*, as M. Desfontaines has ſhewn, in the Annales du Muſéum national d'hiſtoire naturelle, *v.* 6. 445, who aſſerts the only difference to be that *Royena* has only four cells in the fruit, *Dioſpyros* from ſix to twelve; and that the calyx of the latter has ſometimes five or ſix diviſions. Gærtner, *v.* 2. 80. *t.* 94, had already noticed the Linnæan deſcription of the fruit of *Royena*, taken, as he ſays, from Commelin's Hortus, *v.* i. *t.* 96, to be erroneous, and that it is really a berry of four cells, clothed with the calyx, which ſplits irregularly.

The ſpecies of *Dioſpyros* are not very numerous. They are trees, with very hard wood, and the fruit, when perfectly ripe, is in moſt caſes eatable, being ſweet and glutinous. In an unripe ſtate it is powerfully aſtringent. The leaves are alternate, ſimple, generally undivided. Flowers inconſpicuous, yellowiſh.

D. *Lotus*. Linn. Sp. Pl. 1510. Pallas Roſs. v. i. p. 2. 20. t. 58. Mart Mill. Dict. v. 2. (Guaicum patavinum; Ger. em. 1495. f. 1, 2.) "Leaves pale on the under ſide." This grows wild in the ſouth-eaſt parts of Europe, and will bear our climate in the open air, but we have never ſeen the ripe fruit. In Italy it comes to tolerable perfection, but is not eſteemed, otherwiſe than as a remedy for diarrhœas.

D. *virginiana*. Linn. Sp. Pl. 1510. Mill. Ic. t. 126. Mart. Mill. Dict. v. 2. (Piſhamin, or Virginia Plum; Park. Parad. t. 569. f. 6.) "Leaves both ſides of the ſame colour." A native of Virginia, which has long been in our gardens. The leaves are ſmaller and broader in proportion than thoſe of the preceding, and though, like them, paler beneath, much leſs remarkably ſo. The flowers alſo are ſmaller.

D. *Ebenum*. Linn. Suppl. 440. (D. melanoxylon; Roxburgh Corom. v. i. 35. t. 46.) Leaves elliptic-oblong, ſmooth, coriaceous, reticulated with veins. Buds hairy.—Found in the vaſt woods of Ceylon by Koenig, who ſent it to Linnæus as the true Ebony. Dr. Roxburgh alſo ſpeaks of it as the well-known and valuable Ebony. "It is only the centre of large trees," ſays that faithful obſerver, "that is black and valuable, and the quantity found is more or leſs, according to the age of the tree. The outſide wood is white and ſoft, and either decays ſoon, or is deſtroyed by inſects, which leave the black untouched. The ripe fruit is eaten by the natives, but is aſtringent and not very palatable." We are certain of the above ſynonyms, and therefore cannot account for the report of a confuſion of two ſpecies in Linnæus, which Retzius calls D. *Ebenum* and D. *Ebenaſter*; the latter being the *Ebenum* of Linnæus, the former the genuine Ebony. See Martyn's Miller, and Retzius's Obſ. Bot. faſc. 5. 31, who quotes Rottboll in the New Copenhagen Tranſactions.

Four other Eaſt Indian ſpecies are deſcribed and figured by Dr. Roxburgh, D. *ſylvatica*, t. 47. D. *montana*, t. 48, D. *chloroxylon*, t. 49. "The wood of this is yellowiſh, very hard and durable, and uſed by the natives of the Orixa mountains for various economical purpoſes. The fruit when ripe is eaten raw, and is very palatable:" and D. *cordifolia*, t. 50.

Loureiro deſcribes the true Ebony as a diſtinct genus by the name of Ebenoxylum, which ſee. This is a native of Cochinchina.

Diospyros, in *Gardening*, contains plants of the deciduous ſhrubby flowering exotic kind; of which the principal ſpecies cultivated are, the European date plum (*D. Lotus*), and the American date plum (*D. virginiana*). The firſt of which riſes with a tree-like ſtem to the height of ſix feet; the ſmaller branches ſpread a little, and are yellowiſh; the leaves oval-lanceolate, large, quite entire, paler underneath, ſomewhat hoary, with the veins ſomewhat hairy; the flowers are ſmall, reddiſh white, rotate; the fruit the ſize of a cherry, yellow when ripe, ſweet with aſtringency; and the plant is a native of Europe.

The latter ſort riſes here to the height of from fourteen to ſixteen feet, commonly dividing into many irregular trunks near the ground; the wood is very hard, but brittle and ſomewhat white; the branches are many, and grow ſlender to the end, covered with a very thin greeniſh bark; the leaves many, broad, green, without dent or notch on the edges; ſo like the former, that it ſeems at firſt to be the ſame; it has a dark brown bark on the branches, but on the twigs it is greyiſh; the fruit is in form and bigneſs like a date, very firm as that fruit, almoſt as ſweet, with a great, flat, thick, large kernel within. It is found in Virginia and Carolina, in America.

Method of Culture.—The manner of increaſing theſe plants is by ſowing the ſeeds in a warm ſituation in the open ground, in the ſpring; but it is better when done in pots or beds filled with good earth, and plunged into a moderate hot-bed, as they riſe more quickly, and advance with greater rapidity. When the plants have attained ſome growth, they ſhould be gradually expoſed to the open air until the autumn, when thoſe in the full ground ſhould be carefully protected from froſt by mats or other means, and thoſe in pots placed under a garden frame, on moderate heat, free air being admitted when the weather is mild. Early in the following ſpring they ſhould be removed, and planted out in a warm ſituation in the nurſery, at proper diſtances, to remain two or more years, when they will be fit to be finally put where

 they

they are to remain. They have a good effect in the large clumps, borders, and other parts of shrubberies, being sufficiently hardy when of proper growth to resist the effects of frost in this climate.

DIOS-SACRA, in *Ancient Geography*, a place of Asia Minor, upon the Thracian Bosphorus, near and in the northern part of the promontory Caracion.

DIOS-SOTEROS PORTUS, a port of the sea of Laconia, situated at the bottom of the port, in which is found *Epidaurus Limera.*

DIOSTETWI, in *Geography*, a town of Silesia, in the province of Oels; three miles S.S.W. of Mittelwalden.

DIOU, a town of Persia, in the province of Chorasan; 270 miles N. of Herat.

DIOXIA, διοξεια, in *Music*, a name sometimes given by the ancients to the diapente.

DIP *of the Horizon*. See DEPRESSION.

DIP, in *Mining*, or *pitch*, signifies the greatest inclination of a stratum to the horizon; the direction of this is always at right angles to the course, stretch, drift or run, which is that direction in which a level line might be drawn upon the stratum. The prevailing dip of the strata in England is towards the S.E., and consequently they are level in a N.E. and S.W. direction, and it seems more than probable, that the strata of the whole island did occupy that position before the rupture and denudation of parts of its surface: the quantity of this dip was, however, but small, probably not more than 1 in 70 or 80.

DIPÆA in *Ancient Geography*, a small town of Arcadia, in that part called Mœnalia.

DIPHACA, in *Botany*, (from δις, *double*, and φακη, a *legume*.) Loureiro Cochinch. 453. Clafs and order, *Diadelphia Decandria* Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juff.

Gen. Ch. *Cal.* Perianth five-cleft, gibbous, permanent; its segments acute, the lower one longest. *Cor.* Papilionaceous. Standard roundish, somewhat triangular, notched, ascending; wings ovate, shorter than the standard; keel of two petals, lunate, equal to the standard, with long slender claws. *Stam.* Filaments 10, united in two parcels, five in each; anthers oblong, incumbent. *Pist.* Germens two, oblong, compressed, straight; style of each awl-shaped, longer than the stamens; stigmas thickish. *Peric.* Legumes two, compressed, straight, pointed, jointed; the joints ovate, striated, smooth, unequal in size. *Seeds* ovate, compressed.

Eff. Ch. Legumes two. Stamens in two equal sets.

D. *cochinchinensis*. Lour. Cochinch. 454. (Solulus arbor, or Roraco; Rumph. Amb. book 5. 100. t. 128.) A tree eight feet high, cultivated in the gardens of China and Cochinchina, and called in the last-mentioned country *Kim phung*. Its *bark* is uneven, brown, without thorns. *Leaves* pinnate, of about seven pairs, with an odd one, the leaflets ovate, rather small, smooth, nearly sessile, opposite or alternate. *Flower-stalks* in pairs, axillary, single-flowered. *Flowers* pale.

Such is Loureiro's account, who quotes *Hedysarum Ecastaphyllum*, now *Pterocarpus Ecastaphyllum*. Linn. Syst. Veg. ed. 14. 642, as a synonym. But the latter is a Jamaica plant, with large simple leaves, silky beneath. The essential character, as given above, is truly wonderful, if correct, but Rumphius describes and figures single legumes from each flower, according to the universal course of nature in this tribe, as far as we have any knowledge. His synonym, therefore, or more probably the description of Loureiro, must be erroneous.

DIPHRI, in *Ancient Geography*, a town of Phœnicia. Steph. Byz.

DIPHRYGES, or DIPHRYX, in the *Ancient Pharmacy*, the scoria or calx of melted copper gathered in the furnace, when the metal was run out.

The word is formed from the Greek δις, *twice*, and φυγειν, *to roast*.

DIPHTHERA, διφθερα, among the *Ancients*, a garment made of skins, and worn only by shepherds and country labourers.

DIPHTHONG, διφθογγος, in *Grammar*, a double vowel, or the union, or mixture, of two vowels pronounced together, so as only to make one syllable; as (1) the Latin *ae*, or *æ*; *oe*, or *œ*; (2) the Greek αι, ει; (3) the English *ai*, *au*, &c. See VOWEL, and SYLLABLE.

The word is Greek, and is compounded of δις, *twice*, and φθογγος *sound*.

Ae answers to *ai*, the proper; and *æ*, the improper diphthong of the Greeks; *e. g.* Αινειας, *Æneas*; σφαιρα, *sphæra*, &c. And, on the contrary, the Romans, when they had occasion to divide the *ae*, changed it into the Greek *ai*; *e. g.* *aulai*, for *aulæ*, &c.

Ai, by some, is made a Latin diphthong, as in *aio*, *Caius*, &c. But in *ais*, and *ait*, *i* manifestly belongs to the latter syllable; and the Greek write not γαι ος, but γα ιος; whence it seems plain that *ai*, in the Latin tongue, is not a diphthong, as in the Greek.

The Latins pronounced the two vowels in their diphthongs much as we do, with this exception, that the two were not heard equally, but the one was somewhat weaker than the other; though the division was made with all the delicacy imaginable; among us most of the Latin diphthongs are lost in the pronunciation; their *æ* and *œ* are only spoken as *e's*; so also the English *ea*, *oa*, &c. though wrote with two characters, are pronounced as simple sounds.

In English, French, and divers other languages, one may distinguish diphthongs with regard to the eye, from diphthongs with regard to the ear.

A diphthong with regard to the eye is formed of two vowels, meeting in the same syllable, whether the particular sound of each of them be heard in the pronunciation, or whether the sound of one of them be drowned; or, lastly, whether a new sound, different from either of them, result from both. In the two latter cases, it is with some impropriety that we call them diphthongs: the first only are real diphthongs, as being such both to the eye and ear.

Diphthongs, with regard to the ear, are either formed of two vowels, meeting in the same syllable, whose sounds are severally heard; or of three vowels in the same syllable, which only afford two sounds in the pronunciation.

On this last occasion, diphthongs, with regard to the ear, are triphthongs with regard to the eye.

English dipthhongs, with regard both to the eye and ear, called *proper* diphthongs, are *ai*, as in *fair*; *au*, in *laud*; *ee*, in *bleed*; *oi*, in *void*; *oo*, in *food*; and *ou*, in *house*.

English *improper* diphthongs, or diphthongs with regard to the eye, are *aa*, pronounced only like *a*, as in *Aaron*; *ea* like *a*, as in *swear*, *heart*, or like *e*, as *already*; or like *ee*, as *veal*; *eo*, like *e*, in *feoffee*; or like *o*, as in *George*; *eu*, or *ew*, like *u*, in *Deuteronomy*; *ie*, like *e*, as *cieling*, *field*; *ei*, like *a*, in *feign*; or like *e*, in *deceit*; *oa*, as in *cloak*, *doat*; *oe*, as in *doe*, *oeconomy*; *ue*, as in *guess*; and *ui*, as in *guile*, *recruit*.

DIPHYES, from δις, and φυειν, *to generate*, in *Natural History*, a name given by some authors to a kind of stone, which represents both the male and female parts of generation of the human species; and owes its figures merely to the accidental conformation of the hinge and protuberances of a shell, in which it has been formed. We have a species of chama, whose external form at the mouth represents the

female pudenda; but the figure of the ſtone is owing to the internal ſhape of the ſhell in which it has been caſt. This is an unknown ſpecies of concha anomia, which has ſuch ridges in one ſhell, and ſuch cavities in the other, that the ſtone caſt or moulded in it, has on one ſide the figure of the female pudenda, and on the other the male: it is uſually of a duſky brown colour, and of a ferruginous ſubſtance. As the ſame ſhell may, however, have received in different places different ſubſtances into its cavity, all which would neceſſarily be of this form, we hear, among authors, of ſome black, and ſome white ſtones of this kind. Authors have treated of this ſtone in a very idle and fabulous manner; but this is its true hiſtory.

DIPHYLLEIA, in *Botany*, (from δις *double*, and φυλλον *a leaf*, "becauſe the plant is conſtantly furniſhed with two leaves," Michaux Boreali-Amer. v. 1. 203. Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Ranunculaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of three oval, concave, deciduous leaves. *Cor.* Petals ſix, larger than the calyx, ſpreading, oval, concave, deciduous. *Stam.* Filaments ſix, very ſhort, flat; anthers oblong, vertical, their cells joined by a membrane from top to bottom, by the ſeparation of which they open. *Piſt.* Germen ſuperior, ovate; ſtyle ſcarcely any; ſtigma capitate. *Peric.* Berry nearly globular, of one cell, ſeſſile. *Seeds* two or three, roundiſh.

Eſſ. Ch. Petals ſix. Calyx of three leaves, deciduous. Berry ſuperior, of one cell, with two or three ſeeds.

D. *cymoſa.* Michaux, t. 19, 20. Found by that botaniſt in the rivulets of the high mountains of North Carolina, flowering early in May. *Root* creeping, apparently perennial, jointed. The *herb* has the habit of *Podophyllum peltatum*. *Stem* ſimple, two feet high. *Leaves* two, alternate, ſtalked, kidney-ſhaped, ſomewhat peltate, two-lobed, jagged, toothed, veiny, ſmooth. *Cyme* terminal, many-flowered, erect. *Flowers* white. *Stamens* ſhorter than the petals, and oppoſite to them. *Berries* blueiſh-black, with purple ſeeds.—From the deſcription and figures of Michaux, who thinks this genus allied to his *Caulophyllum*, t. 21, the *Leontice thalictroides* of Linnæus. The latter however belongs to the natural order of *Berberides* in Juſſieu.

DIPHYSA, (δις *double*, and φυσα a *bladder*, from the two inflated appendages to the legume,) Jacq. Amer. 208. Schreb. 500. Willd. Sp. Pl. v. 3. 1130. Juſſ. 362. Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, bell-ſhaped, a little compreſſed, divided half-way down into five ſegments; the two uppermoſt roundiſh, obtuſe, flat, widely ſpreading; the two lateral ones ovate, acute, erect, flattiſh; the lowermoſt lanceolate, pointed, concave, erect, rather longer than the reſt. *Cor.* papilionaceous. Standard obovate-oblong, large, notched, flat, with a concave claw as long as the tube of the calyx, the whole ſo bent back that the ſtandard itſelf is parallel to the claw; wings two, oblong, obtuſe, flat, ſhorter than the ſtandard, ſpreading in front, cohering behind ſo as to look like another ſtandard, furniſhed with a ſmall appendage at their baſe, tapering down into a ſlender claw, and curved backward in a ſemi-circle; keel ſickle-ſhaped, pointed, compreſſed, ſhorter than the wings, furniſhed with an appendage on each ſide at the baſe, divided behind at the lower part, and tapering into two ſlender erect claws, curved backward in the upper part ſo as to become parallel to the claws. *Stam.* Filaments 10, diadelphous, nine in one ſet, with a ſingle one, the length of the keel, in which they are encloſed; anthers ovate, ſmall. *Piſt.* Germen linear, roundiſh, ſtalked, about the length of the keel; ſtyle capillary, deſcending, extending beyond the keel; ſtigma ſimple, acute. *Peric.* Legume linear, compreſſed almoſt flat, obtuſe, of one cell; accompanied on each ſide by a large, longitudinal, membranous, inflated bladder, cloſed all round, originating from the oppoſite ſutures on each ſide. *Seeds* ſeveral, oblong, obtuſe, compreſſed, furniſhed with a ſmall hook. *Jacq.*

Eſſ. Ch. Calyx five-cleft, unequal. Legume of one cell, with many ſeeds, compreſſed, accompanied by a large longitudinal bladder at each ſide.

D. *carthagenenſis.* Jacq. Amer. 208. t 181. f. 51. Mart. Mill. Dict. v. 2. Common every where in buſhy places about Carthagena in New Spain, eſpecially at the foot of a hill near the leper's hoſpital, bloſſoming in Auguſt and September. The inhabitants call it *Vivaſeca*.

Jacquin, from whom alone we have any knowledge of this plant, Linnæus having left it unnoticed, deſcribes it as a ſhrub about ten feet high, of no beauty, and without thorns. *Leaves* pinnate, with an odd one, ſmooth, about two inches long, on the younger branches. *Flower-ſtalks* axillary, ſlender, each bearing two or three yellow inodorous flowers, about the ſize of the common *Colutea fruteſcens*. The bladders of the fruit are very remarkable. The *legume* is ſcarcely two inches long, and remains ſome time on the tree, falling to pieces at length tranſverſely, each portion containing one yellowiſh ſeed.

DIPLASIASMUS, from διπλασιαζω, of διπλοος, *double*, in *Medicine*, a reduplication of diſeaſes.

Diplasiasmus is alſo uſed for two muſcles in the arm, which ſerve to turn it about.

DIPLAZIUM, in *Botany*, (from διπλαζω, *to be double*), Swartz Syn. Filicum 91. (Hemionitis; Smith Act. Taurin. v. 5. 410. t. 9. f. 1. Tracts 235. t. 1. f. 1. Claſs and order, *Cryptogamia Filices*. Nat. ord. *Filices*. Linn. Juſſ.

Gen. Ch. *Capſules* annulated, in diſperſed twin lines, which are either ſimple or branched, running parallel, and cloſe, to the veins on the back of the frond. Sometimes one line is continued further than its companion, and in ſome parts of the frond even entirely ſolitary lines may be found; but it is ſufficient for the generic character if there be twin lines any where. *Involucrums* likewiſe in pairs, each conſiſting of an uninterrupted membrane, originating from each ſide of the vein, and ſeparating at its oppoſite margin.

Eſſ. Ch. Fructification in ſcattered lines, each of them double, with a vein running between. Involucrums originating from the vein and each ſeparating outwards.

Obſ. This genus was very properly eſtabliſhed by Dr. Swartz as diſtinct from the original *Hemionitis* of Linnæus, which he having ſeen in its native freſh ſtate found to have no involucrum. See Hemionitis. Dr. Smith, not having had the ſame opportunities of examining the latter, conceived his ſpecimens might have loſt this part from age, and therefore not being able to depend on a negative character which it was impoſſible to prove, he conſidered the ſpecies with involucrums as the only ones in a perfect condition.

Dr. Swartz enumerates nine ſpecies of *Diplazium*. Good examples of the genus are, D. *plantagineum*, Sw. Syn. Fil. 91. t. 2. f. 4. (Aſplenium plantagineum; Linn. Sp. Pl 1537. Hemionitis plantaginea; Sm.) "Frond ſimple, ovato-lanceolate, crenate, ſomewhat ſerrated; with a ſquare ſtalk." Found by Browne in Jamaica. The *ſtalk* is ſimple, ſmooth, naked, ſquare, about a ſpan high. *Leaf* about the ſame length, ovato-lanceolate; rather acute, crenate approaching to ſerrate with a ſtrong mid-rib, and numerous alternate, forked, diſtinct veins, along which the lines of fructification run on each ſide.

D. *grandifolium.* Sw. Syn. Fil. 91. (Aſplenium grandifolium; Sw. Prod. 130.) "Frond prinnate; leaflets lanceolate, broad, ſomewhat ſerrated, angular at the baſe."

Native

Native of Jamaica. *Frond* two or three feet high. *Leaflets* alternate, pointed, unequally ferrated and flightly jagged. *Veins* numerous. *Lines* of fructification neither branched at their bafe, nor confluent at their extremities. *Involucrum* dark brown, revolute. *Capfules* pale.

DIPLOCONION, in *Ancient Geography*, a place of the Thracian Bofphorus, to the S. W. of *Rhodiorum Portus*.

DIPLOE, in *Anatomy*, is the reticular texture connecting together the two tables of the fkull; fee CRANIUM.

DIPLOIS, διπλοις, in *Antiquity*, a double pallium, or cloak, worn chiefly by the Cynics.

DIPLOMA, (διπλωμα, a διπλεμαι, *duplicor*) was originally a letter or writing of a fovereign conferring a title or dignity, or granting fome immunity or privilege, or fome land, to be held in fief. The oldeft is that of the emperor Galba difmiffing fome veteran foldiers. They were called Diploms, becaufe they ufed anciently to be written on waxed tables folded together.

As thefe Diploms ferve to eftablifh the rights of fome families, towns, churches, convents, and provinces, to eftates, lands, commons, or to any particular rights, privileges, and immunities, it is of material importance to be acquainted with the rules by which their authenticity may be proved or difproved. See DIPLOMATICS.

In a more enlarged fenfe, the word Diploma is fynonymous with document, and fignifies any writing which records a particular important tranfaction in a folemn form.

Latterly the meaning of the word Diploma has been reftricted to a letter or writing of an univerfity, conferring the degree or dignity of doctor.

DIPLOMA, in *Chemiftry*, denotes a double veffel. Thus when one veffel is put into another; the ingredients in the firft, and the fire under the laft, the chemift calls it boiling in diplomate.

DIPLOMACY, in *French, la Diplomatie*, is the knowledge of the relations of independent ftates to each other.

The treaties, conventions, agreements, or rather the documents which more particularly eftablifh the relative rights of nations, and the obligations to which they are refpectively pledged, were formerly called diplomas.

A diploma, fays Johnfon, is a letter or writing conferring fome privilege; but in a more enlarged fenfe, it is any writing which ftipulates a right, confers a privilege, or records one particular important tranfaction in a folemn form; and the fcience which leads to the difcovery of the age, authenticity, import and value of fuch writings, is called *Diplomatics* (which fee.)

But the relations of independent ftates to each other do not originally reft upon exprefs ftipulations only. There is a natural law which traces the rights to which nations are refpectively entitled. (See LAW of *Nations*.) Yet as there is no fuperior coërcive power to enforce the performance of the correfponding obligations, nations are induced to unite together by means of treaties which are to render them more fecure in the enjoyment of their rights. See TREATIES *of Peace and of Commerce*.

The collection of the principal treaties on which the external relations of the independent ftates of Europe have depended till the year 1801, or the peace of Amiens, is to be found in "Leibnitz's Corp. Jur. Diplomat. Corps Diplomatique du Droit des Gens." Amfterdam, 1731. 8 vol. fol. "Hiftoire des Traités de Paix et autres Négociations des Puiffances de l'Europe depuis la paix de Vervins jufqu'à celle de Nimégue." Amfterdam, 1725, 2 vol. fol. "Lord Liverpool's Collection of Treaties of Peace." 1785. "Wenk's Codex Juris Gentium recentiffimi." Lipfiæ, 1788, 2 vol. 8vo. "Recueil des principaux Traités conclus par les Puiffances de l'Europe depuis 1761, par M. de Martens' Goetting. 1791, 8vo. "G. F. Von Martens, Grundrifo einer Diplomatifchen Gefchichte der Europæifchen Staatfhændel und Friedens fchlüffe bis züm Frieden zü Amiens." Hamburg, 8vo.

Unfortunately thefe conventions labour under the fame difficulty with the law of nations itfelf. Nothing enfures their performance. Independent and powerful ftates break their contracts at pleafure. In vain does juftice condemn fuch infractions of folemn engagements; there is no legitimate fuperior power to which fhe can truft her fword for the punifhment of the offenders. Neither has the continual refidence of diplomatic agents, introduced by cardinal de Richelieu, been able to keep up more fecurely the relations of amity between independent ftates; and vainly have the nations of Europe endeavoured to confide the guarantee of their rights to a combination of a certain number of ftates leagued againft others of nearly fimilar ftrength.

It was at the beginning of the fixteenth century that the reformation, which broke down the overgrown power of Auftria, and eftablifhed the independence of Holland, gave the firft hopes of fuch a balance. Thefe hopes were invigorated by Sweden and Turkey, obtaining in the political fyftem of Europe an importance which they had not before enjoyed. The progreffive growth of the Pruffian monarchy, and the interference of Ruffia in the concerns of Europe, were fuppofed to render the equipoife ftill more perfect; and the creation of a Tranfatlantic republic, which leffened the weight of Great Britain, was hailed as the only circumftance that had been wanting to confolidate the admired fabric of a connected fyftem, in which one part of the European commonwealth was to be balanced by the other. (See POWER, *Balance of*.)

In this ftate of apparent fecurity, the ftudy of diplomacy was almoft every where neglected. The maintaining of the accuftomed relations of amity was confidered as being fo eafy and fo fimple that a moderate fhare of talents, a fine figure, and a noble birth, were fufficient recommendations for the moft important diplomatic functions. They were entrufted to men capable of foftering intrigues with courtiers, kept miftreffes, and favourites, but utterly unacquainted with the true interefts of nations in their external concerns. The temper of the fupreme magiftrate abforbed their fawning attentions, whilft the nature of the component parts of the people which he governed never attracted their regard; fo great was their confidence in the talifman of modern diplomacy.

But the chimera of an equilibrium, that was to prevent the recurrence of wars, or at leaft to fhorten their duration, fuddenly vanifhed at the very time when it was triumphantly fpoken of as realized. The partition of Poland, the incoherent and impolitic coalitions againft France during her revolutionary frenzy, and the feeblenefs and unpopularity of the governments againft which the fury of the French was directed when they began to yield to the luft of conquefts, overturned the bafis on which the relations of amity between the European powers had fondly been confidered as immoveably fixed.

Whether the order of things, which will emerge from the prefent chaos of European politics, will fuffer the fuperftructure of the connections of independent ftates to be raifed anew on the fame foundation, it is impoffible to conjecture. The principle of all external relations remains in the mean time what it has been. Alliances muft be courted with thofe powers from which no injury is to be apprehended, and which yet are able to annoy that power, or thofe ftates, which,

which, from their geographical pofition and fuperior force, are dreaded as natural enemies. See ALLIANCE.

As diplomacy is the knowledge of the actual relative rights of nations, it conftitutes the bafis of the negociations, to which governments have recourfe, when fuch alliances are to be formed, when new ftipulations are to be entered into on points in which two or more independent ftates are mutually concerned, or when difputes about the non-performance of fome obligations, or about the violation of fome rights, are to be fettled. Hence, the term diplomacy is frequently applied, in a more reftricted practical fenfe, to the conducting of fuch negociations, and to that branch of politics which provides for the fafety of the ftate by means of friendly connections with other independent powers. In this laft acceptation, it is better known by the appellation of *Foreign Politics*.

The management of foreign politics is generally delegated by the executive power to one, or, in fome countries, to two minifters of ftate, called "Minifters for Foreign Affairs." In France, it is entrufted to the "Miniftre des Relations Extérieures;" in Spain, to the "Minifter del Defpatcho Univerfal;" in Great Britain, to the "Secretary of State for the Foreign Department," whofe province it is to watch over both the political and commercial interefts of the country abroad, and to appoint its diplomatic and commercial agents.

The functions of diplomatic agents, in general, are, to watch, in the ftate to which they are fent over, the interefts of the ftate which fent them: to endeavour to obtain, by fkilful negociations, the conceffion of the points which they are inftructed to folicit; to collect the moft complete information about the ftrength, energy, connections, and projects of the government of the country where they refide; and to tranfmit regular difpatches, on thofe different fubjects, to their own governments. See DISPATCHES.

As thefe reports, or difpatches, contain, in general, communications of importance, they are moftly written in cyphers, which, for greater fecurity, muft frequently be changed. See CIPHER.

The qualities moft requifite in a diplomatic agent are, political information, an active and enlightened mind, a correct judgment, a dignified firmnefs, conciliating manners, and an inviolable fidelity and difcretion, which, however, muft not exclude candour and opennefs. See NEGOCIATOR.

The aggregate of all the diplomatic agents of foreign powers, refiding at one time in the fame place for diplomatic purpofes, is called the *Corps Diplomatique*, diplomatic body.

There are three claffes of diplomatic agents. The firft is that of ordinary and extraordinary ambaffadors. (See EMBASSADOR.) They are fent to thofe powers with which the ftate wifhes to treat on a footing of equality, whether they be really of equal rank, or only confidered as fuch by courtefy. The fecond is that of plenipotentiaries, or envoys. (See ENVOY and PLENIPOTENTIARY.) They differ from ambaffadors with regard to their prefentation only; they do not go, nor are they received, in ftate at their firft audience.

The third clafs of diplomatic agents is, that of refidents and chargés d'affaires. The latter are generally firft fecretaries of ambaffadors, left to tranfact the bufinefs of their refpective ftates, during the temporary abfence of the ambaffadors. Refidents are permanent diplomatic agents in fmall principalities, fmall republics, or Hanfeatic cities. See RESIDENT.

The fubaltern agents in diplomacy are the fecretaries of legation, private fecretaries of the ambaffadors, and dragomans, or interpreters. See DRAGOMAN and SECRETARY.

Commercial agents are appointed to watch over the commercial interefts of the ftate in the country where they refide, to affift the trading fubjects of the government, by which they are appointed, in their dealings, according to the fubfifting treaties, and to communicate to their refpective governments any commercial or political information which they conceive to be of importance. They are of two forts; general confuls, in foreign places of extenfive trade, and vice confuls appointed by the former in lefs important commercial places of the fame diftrict or country, and approved of by government. See CONSUL.

DIPLOMATICS, DIPLOMATICA, is the knowledge of the age, authenticity, precife import, and relative value of old documents, formerly called diplomas.

Documents, or diplomas, are writings which ftipulate a right, confer an eftate, a fief, a privilege, a title, or a dignity, or record one particular important tranfaction in a folemn form. The word diploma occurs but rarely in the documents themfelves. They are generally ftyled "Præceptum, Auctoritas, Privilegium, Pagina, Charta, Littera, or Litteræ, Apex, or Apices, Pancharta, Sanctio Pragmatica, Inftrumentum, Indiculus, Placitum, Notitia, Bulla, Sigillum, Sigillati Apices, &c." The ancients called them "Syngrapha, Chirographa, Codicilli." The originals are named "Exemplaria, or Autographa, Chartæ Authenticæ, Originalia;" and the copies "Apographa, Copiæ, Particulæ." The collections that have been made of them are denominated "Chartaria, and Chartulia," and the places where they ufed to be kept "Scrinia, Tabularium, Aerarium," and in Greek "Archeium, or Archivum."

Documents are almoft as ancient as writing itfelf. Every civilized nation, the Hebrews, Phœnicians, Egyptians, Babylonians, Perfians, Greeks, and Romans, had documents which they preferved in their archives, and which they confulted for hiftorical and juridical information. Yet none have been difcovered of a date anterior to the 5th century. The ancients were accuftomed to reduce their contracts and treaties into writing; but they engraved them on tables, or covered them over with wax, brafs, copper, ftone, or wood, and all thofe which were not traced on brafs or marble have perifhed by the length of deftructive time.

Documents, or diplomas, were anciently written on metals and ftones. Job exclaims, "Oh! that my words were now written! Oh! that they were printed in a book! that they were graven with an iron pen and lead in the rock!" Job xix. 23, 24; afterwards they were written on paper and parchment. The paper of the ancients came from Egypt, and was formed of thin leaves, or membranes, taken from the branches of a tree named Papyrus. Hence it was called "Papyrus, Biblum Ægyptiacum," or fimply "Charta." (See PAPER, PARCHMENT.) The Papyrus, however, was never ufed in England; neither was it known in Germany nor in Hungary. The two latter countries invariably employed parchment in their diplomas till the 14th century, when the ufe of modern rag-paper was introduced, even on folemn occafions, or for the recording of important tranfactions. In England, all documents or writings of importance are ftill invariably written on parchment.

The ufe of ink in writing is very ancient. Baruch declared, that he wrote Jeremiah's prophecies with ink in the book. Jeremiah, xxxvi. 18. Black ink, as it is the oldeft, was the moft common. The ancients alfo wrote with red ink, made of vermilion, red-lead, or purple colour, "facrum encauftum;" fometimes in letters of gold, filver, and purple; and fometimes with blue, green, or mixed ink, of a variegated hue.

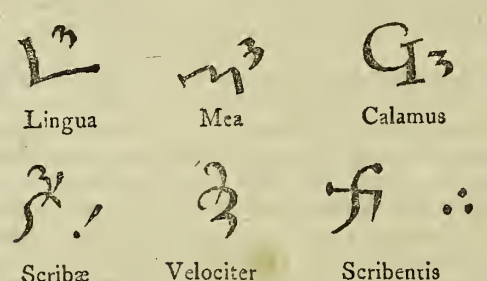
For

For the invention of alphabetical writing, ſee Letters. With regard to the poſition of the lines, *verſus*, there were three ſorts of writings; the horizontal, from right to left, from left to right, or both ways, called *βȣςροφηδὸν*; the perpendicular, from top to bottom, or from the bottom to the top, and both ways, either from right to left or from left to right; and the circular, *orbicularis ſcriptio*, as round ſeals, medals, &c.

In the oldeſt documents there are no points, no intervals between the words. The letters ſtand one cloſe to the other without any diſtinction in the text itſelf; there is only a ſmall ſpace left after the dates, royal ſignatures, and abbreviations. In 931, ſome interval between the words was firſt obſerved in the court hand, the letters of which are of a very diſproportionate length. They are called "Litteræ longiores, exiles, criſpæ and protractiores." Punctuation was introduced in the beginning of the tenth century, but without either colon or comma. It was improved towards the end of the twelfth and in the thirteenth century.

J. L. Walther, in his Lexicon Diplomaticum. Goettingæ. 1745. fol. which ſhould have properly been entitled Lexicon Abbreviaturarum, gives the beſt account of the abbreviations that have been uſed in different centuries.

The characters which are called "notæ, or notæ Tironis," Tiro's notes, are not to be found in any alphabet. They repreſent whole words. Their uſe is very ancient. They were invented to facilitate quick writing, and as ſuch they correſpond with the different characters of modern ſhort-hand writing. That ſuch characters were known to the Hebrews is inferred from king David's ſaying in the beginning of the 45th Pſalm: "My tongue is the pen of a ready writer." It is, however, certain that Xenophon was the firſt who uſed them among the Greeks, and that Cicero's amanuenſis, Tiro, from whom they derive their name, improved them into a perfect ſyſtem of ſhort-hand writing or tachygraphia. The following lines are a ſpecimen of Tiro's notes.



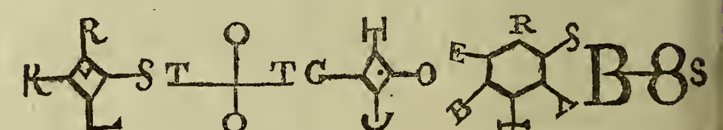
Conſult D. P. Carpentier's Alphabetum Tironianum. Paris, 1747. fol.

The knowledge of the different hand-writings of different ages and nations is beſt acquired in Henſelii Synopſis univerſæ Philologiæ; in Kapp's neu eröffnetem in hundert Sprachen beſtehendem A B C buch; in Mabillon De Re Diplomatica; and in the Nouveau Traité de Diplomatique. vol. ii. p. 479, and vol. iii. p. 687. In England, for inſtance, the old German hand prevailed from the fifth or ſixth century, till the year 1066, when William the Conqueror introduced the Capetian French writing. The new Gothic or black letter, ſuch as is ſtill uſed in the titles of ſome books, prevailed from the thirteenth to the ſixteenth century, when the old elegant Latin or Roman hand was reſtored and beautifully improved in Great Britain.

From the fifth to the thirteenth century the ſign of the croſs, called "Chriſmon, Chriſmum, Chriſmus, or Chriſmos," was uſed in ſignatures. In the ninth century the ſolemnity of the ſigning of documents was increaſed by the addition of the ſymbols of inveſtiture, as "per alapam, per amphoram plenam aquæ maris, per forſices," of which the following inſtance is recorded: "Odo Comes de Corboilo (Corbeil) conceſſit Deo et S. Germano Pontiſarienſi; quandam vieriam quam habebat in terra moriſſarti, deprecante matre ſua comitiſſa de Croceio, cum forficibus, quas in manu tenebat, cum quibus forficibus Robertus Monachus reinveſtivit eum de beneficio loci. Quibus etiam forficibus ſtatim idem comes totondit quendam armigerum Walteri Toſardi." Per oſculum, of which there is this inſtance: "Maino, filius Gualonis, annuente Eudone filio et vieta uxore ſua dedit Deo et S. Albino terram de Brilchiot pro cujus doni confirmatione Walterium Monachum pater et filius in fidei nomine oſculati ſunt. Uxor autem illius, eo quod a femina Monachum oſculari inuſitatum habemus, Lambertum quemdam Præfectum S. Albini, jubente Walterio Monacho, eadem ſententia deoſculata eſt." Per pileum. It was by the ſymbol of the hat that king Richard of England gave the emperor Henry VI., whoſe priſoner he was, the inveſtiture of his kingdom. Per virgam et pileum. The inveſtiture of duchies in England was generally given by the ſymbol of the rod and the hat.

The ſignatures frequently conſiſt of monograms or ciphers, (chifres,) compoſed of the letters or the initials of the names of thoſe who ſubſcribed the documents. The word monogramma is ſeldom mentioned in the text; but, inſtead of it, we find the following expreſſions, ſignum, *i. e.* crucis; "nominis or manus ſignum, manus propria, manus propriæ nota, chirographum, ſignaculum, character, character nominis, regius character, regii nominis character, ſigni character, nominis figura, &c." The firſt who uſed a monogram in the ſignature of a document was *Theodoric* king of the Oſtrogoths between the years 493 and 526. But it was Charlemagne, who rendered monograms faſhionable and introduced their conſtant uſe. Since pope Leo IX. or from the year 1050, almoſt all the bulls of the popes have two monograms, one before and the other after the ſignature of the pope's name. In Great Britain monograms have never been uſed.

The following are the monograms of Charlemagne, Otto the firſt, Hugo Capet, Robert of France, and Boſo king of Provence.



Seals, or ſignets have been uſed ever ſince the time of the patriarch Jacob. Geneſis xxxviii. 18. Exodus xxviii. 11. They were known to the Egyptians, Babylonians, Medes, Perſians, Greeks, and Romans. They are mentioned by the names of ſignum, till the 5th, 6th, and even the 14th century, "bulla, bulla cerea, ſignetum, ſignaculum, impreſſio, imago, imaginis impreſſio, imaginis ſignum ſecretum." But the moſt ancient name is annulus, (in diploms it is often ſpelt anulus,) which laſted until the tenth century, after which the word ſigillum is the moſt general. The Anglo-Saxons uſed ſeals, as appears from documents of the years 955 and 1066. Until the 8th century the affixing of a ſeal was abſolutely neceſſary to complete the ſolemnity of a tranſaction recorded in a document. From the 8th to the 12th century the uſe of ſeals was optional; the ſigns of the croſs and other ſolemnities frequently ſupplied their place. But from the 12th to the 15th century ſeals recovered their ancient

cient importance, and they have been conftantly employed fince that time by kings, princes, bifhops, abbots, noblemen and private gentlemen, fo that no document was reputed valid unlefs properly fealed; indeed the feal fupplied the place of almoft all the other formalities.

The feal was anciently of white wax imprinted on the parchment itfelf, figillum impreffum. This method of fealing was ufed in England until Edward the confeffor and even William the conqueror, or the year 1087; in France until Louis le Gros or the year 1137; in Germany until Frederick I. or the year 1190. It was afterwards pendent from the document, and inclofed in a box or cafe, called *bulla*. The feal itfelf was then named *pendulum*. The oldeft pendent wax feal is that of a document of Noricon bifhop of Laon in Picardy of the year 961. His cotemporary the Englifh bifhop St. Dunftan affixed his feal in the fame manner, fo that the pendent feals are of the fame antiquity in England as in France. The kings of England ufed white wax until Charles I. Green wax is appropriated to the fealing of charters. See SEAL.

Latin was the diplomatic language in both the eaftern and weftern empire until the year of our era 602, after which the Greek language alone was ufed in the documents of the eaftern, and the Latin in thofe of the weftern empire. The Greek was alfo the diplomatic language of the kingdoms of Naples and Sicily during the 11th, 12th, and 13th centuries. In England the Latin and the native or vulgar language were ufed indifferently, the Anglo-Saxon from the 8th till the 13th century, except that from William the conqueror to Edward III. the French was the diplomatic language in public tranfactions; but private documents continued to be written in the Anglo-Saxon. The Latin was entirely difcontinued and the Englifh language alone employed after the year 1362.

Every document has a beginning (prologus), a text, (textus), and a conclufion (epilogus). The formulæ prologi were invocatio divina, nomen et titulus, promulgatio, exordium.

The invocations ufed under the firft Carolingians were: "In nomine Dei et Salvatoris noftri Jefu Chrifti;" or "In nomine patris et filii et Spiritûs Sancti." After Charles the Bald; "In nomine Sanctæ et individuæ Trinitatis;" and in a fuppofed document of Henry II. about the duchy of Benevent, of the year 1014; "In nomine domini Dei omnipotentis patris, filii et Spiritus Sancti," which affords an additional proof of the unauthenticity of this document. In the 13th century, the invocation was fometimes omitted: but in the year 1512, the emperor Maximilian I. obliged the public notaries to ufe the invocatio divina in their inftruments.

With regard to the name and title, the pronoun *ego* or *nos* was not prefixed to the names before the middle of the thirteenth century. Until the fixteenth there never was but one Chriftian name. Of the kings of the Saxon heptarchy in England, there was always one who was confidered as the chief, or fupreme monarch above the other fix. Aetdibalt, in the year 730, is on that account ftyled Rex Britanniæ, although he was only Rex Merciorum. The words Dei gratia were frequently expreffed by "Divina clementia; divina favente clementia; divina concedente, auxiliante, juvante, opitulante, propitiante, difponente, difpenfante, miferanda, præordinante clementia." The moft common is divina favente clementia, which was introduced by Pepin.

The formula promulgationis was for inftance; "Noverint omnes fideles noftri tam præfentes quam futuri." Some documents are without an exordium. This generally expreffed the motives of the tranfaction, which were derived "a pio, ab honefto, ab utili, a decoro, &c.;" for inftance: "Quia memoria hominum labilis eft, et tempora prætereunt more fluentis aquæ."

In the text itfelf we may obferve, that ever fince Otto the Great, kings and emperors, in fpeaking of themfelves, ufe the expreffions "celfitudo, majeftas, ferenitas, regalis magnificentia, fublimitas, regale culmen." The words cum confilio principum, are not to be found before the tenth century, and the term feudum appears only in the time of the emperor Frederick. Till then it is always called beneficium.

The conclufion, or epilogus, contains the formula roborandi, as for inftance: "Et ut hæc auctoritas noftra firma ftabilifque permaneat, chartam hanc confcribi juffimus." It was fometimes ftrengthened by penalties or by maledictions, of which there are inftances of the moft fhocking nature in J. G. Leuckfeld's Antiquitatibus Walkenredenfibus, p. 31, and in other collections of documents. It alfo mentions the witneffes, the date of the tranfaction, when it was refolved upon, which is called actum, and the votum finale; for inftance; "in Dei nomine," or "in Dei nomine feliciter, amen," or "feliciter amen," or fimply "feliciter." But this votum finale is frequently omitted.

Thus the different hand-writings of the different ages; the materials on, and with which the documents are written; their accentuation, punctuation, and abbreviations; their various fignatures, marks, monograms, and feals; the language, ftyle, and orthography of each age, as well as the different inchoative and final formulas, &c. conftitute fo many characters by which the authenticity of a diploma or document is to be afcertained. When it bears all the marks which are requifite for the time when and the place where it is fuppofed to be written, its authenticity is no longer to be doubted; but documents cannot be examined too minutely, becaufe the monks and priefts of former ages have difplayed uncommon ingenuity in making counterfeits. Their fuccefs in thefe forgeries ceafes, however, to aftonifh, when it is recollected that they enjoyed the confidence of princes and ftatefmen, and were even fometimes in poffeffion of their rings and feals.

With regard to manufcripts or books written before the invention of printing, the art of judging of their antiquity and difcerning their real authors, is a branch of literary criticifm, and not of diplomatics. (See CRITICISM, MANUSCRIPT.)

The fcience of diplomatics owes its origin to a Jefuit of Antwerp, named Papebroch, who applied himfelf to the refearch and expofition of old diplomas, about the year 1675. His work is entitled "Propylæum." (See PAPEBROCH) The Benedictine monk John Mabillon, confiderably improved this new fcience in his learned work, "De Re Diplomatica," printed in 1681 (fee MABILLON), which was unjuftly and unfuccefsfully attacked in England by the celebrated Hickes, in his "Ling. veter. Septentr. Thefaurus. Præfatio," p. xxxv. The Italian Maffei's diplomatic hiftory is but a fupplement to Mabillon. But it is to Touffaint and Taffin, two Benedictine monks of St. Maur, that we are indebted for the largeft work extant on diplomatics, entitled "Nouveau Traité de Diplomatique," Paris, 1750—1765. 6 vols. 4to. with plates. The founder of its practical ftudy in Germany was John Heumann von Teutfchenbrunn. His "Commentar. de Re Diplom. Imper." was publifhed in 4to. at Nurenberg in the year 1745. The "Dictionnaire raifonné de Diplomatique," by Dom de Vaines, Paris, 1774, 2 vols. 8vo. is a compilation intended to affift beginners in the fcience.

Diplomatics have been lately reduced to a complete fyftematical

tematical fcience by J. C. Gatterer, in his "Abrifs der Diplomatik," Goettingen, 1798, 8vo. and by C. T. G. Schoenemann, in his "Prolufio de finibus artis diplomaticæ practicæ regundis," and in his "Verfuch eines vollftændigen Syftems der allgemeinen befonders æltern Diplomatik." Goettingen, 1802.

DIPLOPIA, in *Surgery*, is double vifion; from διπλοος, *double*, and οψις, *vifion*. (See the articles Eye, Sight, and Vision.) Perfons affected with this rare difeafe will perceive objects double, treble, or otherwife multiplied, when they look at them with both eyes; but they will generally fee them fingle, when viewed with only one eye. Sometimes, indeed, the objects may appear double when feen with one or both eyes. Commonly the patient fees one of the fpectra more diftinct than the other; fometimes, however, he fees both equally diftinct, fo that he cannot afcertain the real fituation of the object by the fenfe of fight.

Double vifion is fometimes temporary, and of fhort duration; but fometimes it is permanent, and even periodical. Sometimes the patient fees double, only after he has exerted his eyes violently for a fpace of time; fometimes he fees objects double only from one fide or the other, either right or left; fometimes alfo he fees double, whichever way he may direct his eyes.

The caufes of double vifion may be diftinguifhed into four claffes. In the firft, the object produces a double fpectrum upon the retina; in the fecond it forms a fpectrum in one eye, which is different, with refpect to apparent fize, pofition, diftance, diftinctnefs, &c. from that which is formed in the other; in the third the fpectrum is formed upon a part of one eye not correfpondent with that upon which it is formed in the other; or the fenfation of the optic nerve is difordered. When the difeafe arifes from caufes of the firft and fourth clafs, the patient fees double as well when he ufes a fingle eye, as when he ufes both; but when it arifes from caufes of the fecond and third clafs, he only fees double when he ufes both eyes at once; and when he fhuts the one, he fees objects perfectly natural, that is, fingle, with the other.

The principal caufes of the firft clafs are: 1ft, an unevennefs of the cornea, which is divided into two or more convex furfaces; 2d, an unevennefs of the anterior furface of the cryftalline lens, which is divided into feveral feparate furfaces; 3d, a double orifice in the iris, or a double pupil, as it is termed. Thefe caufes are incurable. The caufes of the fecond clafs are, in general, fuch as are rather poffible, than that they have actually been obferved. All the defects of vifion to be mentioned hereafter may fometimes arife only in one eye; the refraction of the rays of light may be ftronger in one eye than in the other; the patient may be in one eye *myops*, and in the other *prefbyops*; in confequence of a peculiar defect of vifion, the patients fee every ftraight object as if it were crooked; all which defects may give rife to double vifion. The third principal caufe is fquinting. In this difeafe the object is reprefented in both eyes in points not correfpondent with each other. But a perfon that fquints does not fee objects double, unlefs when he fees equally diftinct with both eyes, and the ftrabifmus does not arife from any weaknefs of either of the eyes, but from fome other accidental caufe. (See Strabismus.) This fpecies of double vifion may be eafily known by the patient's having begun to fquint, and to fee double at the fame period of time. The caufes of the fourth and moft frequent clafs are the irritations which act upon the nerves of the eye, and modify their power of fenfation in fuch a manner, that objects which operate upon them are not reprefented in their natural form. Thefe irritations are of various kinds, and generally dependent upon the ftate of the vifcera; they may, however, be produced by other irritating caufes.

In the laft fpecies, the principal object muft be to difcover and remove the irritating caufe. A boy, who became affected with double vifion in confequence of a ftroke which he received from the bough of a tree, was cured by the external ufe of infuf. rad. valerian, with fpir. vin. crocatus. A cafe of double vifion, produced by a violent fright, was cured by means of valerian, after cream of tartar had been ufed for three days previous to its adminiftration; one arifing from bilious obftructions in the abdominal vifcera, was cured by pills of gum galbanum, guaiacum, rhubarb, and Venetian foap, combined with the ufe of emetics and purgatives.

When the irritation is of a tranfient nature, and after it has excited the difeafe, does not continue any longer to exift; or when the difeafe ftill continues after the irritating caufe has been removed, or finally when the irritating caufe cannot be difcovered and accurately determined, the furgeon muft endeavour to remove the complaint by remedies that ftrengthen the nerves and allay irritation. The following are particularly ufeful in thefe cafes: fpir. fal. ammon. dropped into the hand and held before the open eyes; fpir. vin. crocat. externally; the warm eye-bath, efpecially of capit. papav. alb. in decoction; the cold eye-bath; internally, Peruvian bark, valerian, ipecacuanha in fmall dofes, Flor. zinci, and ol. cajeput. In one inftance tart. folub. with fel tauri, and caftoreum; in another, pulvis rhabarb., fel tauri, and afa fœtida; and in a third, fpirit. Mindereri with fel tauri, produced the moft beneficial effects. In general, in all cafes, in which we cannot accurately determine the particular caufe of the difeafe, we may fuppofe it to exift in the vifcera of the abdomen, and in fuch cafes we may often do much good by the ufe of remedies that are gently purgative, and evacuant, and that allay irritation. See Delirium.

DIPONDIUS. See Dupondius.

DIPPEL'S Oil, in *Chemiftry*, fo called from the inventor, Dippel, is the oil procured by the diftillation of bones *per fe*, and rectified by repeated diftillations. The oil at firft is extremely black, thick, tenacious, and fœtid. To rectify it, put it into a clean retort, taking care that none of it foils the neck of the veffel in dropping it in. Then apply a moderate heat, by which a finer and clearer oil will rife, and collect it in a clean receiver, ftopping the procefs as foon as it begins to drop foul and dark coloured. This clearer oil is to be again diftilled with the fame precautions, taking only the firft portion, and thus a perfectly limpid oil is obtained, the fmell of which, though ftrong and penetrating, is fcarcely fœtid, and which is as fluid as water. It muft be preferved, however, in a dark place or an opaque bottle, for the action of the light renders it brown, fœtid, and nearly approaching to the ftate of the oil from which it was obtained. Dippel's oil is a very powerful fudorific in dofes of twenty or thirty drops, and it feems to deferve more notice as a medicine than it has acquired, being now nearly difufed. See the article Oil.

DIPPER, in *Ornithology*. See Columbus *minor*.

DIPPING, in *Calico-Printing*, a procefs ufed in dyeing blue, in which the cloth is immerfed or dipped either in a folution of indigo, or of fome fubftance capable of acting on indigo previoufly applied to the cloth.

The peculiar nature of indigo unfits it for the purpofes of dyeing by the ordinary operations of the art. It confifts, as we fhall have occafion to fhew more fully hereafter, of a peculiar vegetable bafis united to a portion of oxygen, to which it owes its colour and infolubility. When deprived of this oxygen, by fubftances whofe affinity for it are greater, it becomes foluble in the alkalies and alkaline earths, and in

this

this ſtate readily contracts an union with animal or vegetable ſtuffs. On this property of the alkalies to diſſolve deoxygenated indigo, are founded two proceſſes for dipping or dyeing blue, which form the ſubject of the preſent article. The firſt conſiſts in immerſing the cloth in an alkaline ſolution of indigo, and is employed in dyeing thoſe goods, the ground of which is intended for blue or green. The parts meant to remain white, or which have already received ſome other colours, being covered with a reſerve or paſte, to protect them from the effect of the dye.

This proceſs is very ancient.

The ſecond is employed in dyeing thoſe goods intended to exhibit a deſign or pattern in one or more ſhades of blue, upon a white ground, and is called "China blue," or generally upon the continent, Engliſh blue, the proceſs having originated with the calico-printers of this country.

From time immemorial the nations of the eaſt appear to have poſſeſſed a mode of dyeing ſilk handkerchiefs, and other articles of dreſs, by a rude but ſimple proceſs, which is practiſed at this day, and has been adopted, and continues in uſe, in almoſt every part of Europe. It conſiſts in tying knots with great addreſs and nicety on the ſilk in ſuch a manner, that when dyed, the parts encloſed within the knot remain untouched, diſplaying a ground of red, blue, or any other colour, variouſly, and oftentimes not inelegantly diverſified with flowers of white or yellow, according to the primitive colour of the ſilk. This mode of dyeing handkerchiefs was introduced by the Saracens into Spain, where it is now practiſed to a very conſiderable extent. This, in all probability, was the firſt rude eſſay or attempt to imitate the printed linens of Egypt, and was ſucceeded by the mode now practiſed in India, of covering with a compoſition of wax and other ingredients, the parts intended to remain white. Hence we may date the origin of blue dipping, and though the proceſs, as may be ſuppoſed, has been conſiderably improved ſince its introduction into Europe, yet the ancient practice is ſtill in uſe; and wax printing is often employed with conſiderable advantage in the production of particular combinations of dark and light blue, which could not readily be obtained by any other proceſs.

Of the Indigo Vat, and the Proceſs of common blue Dipping.

The ſolution of indigo for blue dipping, is made in large oblong veſſels of wood, ſtone, or other materials, to which the name of vats is given. Thoſe which are made of wood require to be very accurately joined, and well ſecured with bolts and ſtraps of iron; otherwiſe great loſs may ariſe from the conſtant leakage, to which, without great precaution, they are ſubject. In general they are lined with lead, and though the expence in the firſt inſtance is four times that of wood, they are eventually much cheaper. They need fewer repairs, and afford abſolute ſecurity againſt all loſs by leakage, which, in a drug ſo coſtly as indigo, is a conſideration of great importance. Stone vats have been tried in ſome places. At Rouen, according to Berthollet, they are conſtructed of a kind of flint-ſtone, well ſecured both outſide and inſide with a fine cement: and Pileur d'Appligny mentions ſome he had ſeen compoſed of large ſtone ſlabs ſcrewed together at the corners, and the joints of which were covered with a kind of maſtic varniſh. Economy is the chief aim in all theſe various conſtructions, as it matters little what the vat is compoſed of, provided it will hold the dye; and thoſe, in fact, are the cheapeſt, whatever they have coſt, that ſuffer the leaſt to eſcape.

The ſize of the vat varies conſiderably in different dye-houſes, according to the nature and extent of the eſtabliſhment, and the kind of work they are intended for. Four feet wide, ſix feet long, and ſix or ſeven feet deep, are the dimenſions of a well-proportioned vat, calculated for two pieces of calico, or 56 yards of cloth on a frame. Much ſmaller than the ſize here given are in uſe for frames of ſingle pieces, and vats of ſtill larger dimenſions are employed by ſome, whoſe work and cloth require them one or two feet deeper.

The vats are all ſunk in the earth, down to a level, or nearly ſo, with the floor of the dye-houſe. In ſome few old eſtabliſhments, they ſtand two feet, or thereabouts, above the floor, as is univerſally the caſe on the continent. In this caſe, the frames are hoiſted in and out by a pulley ſuſpended over the vat, a moſt awkward and inconvenient practice, which is avoided by ſinking them to the level of the floor. The frames are lifted out with eaſe by the hand, by two men or boys, one at each end, and in a range of ſix or eight vats, the frames are hoiſted out and re-entered in half the time, and with half the trouble, required to manage the pullies.

The number of vats neceſſary in a well arranged dye-houſe muſt depend greatly on the nature and ſize of the eſtabliſhment. Eight of the ſize already given, ranged in one line ſide by ſide, form a good ſeries: double or treble that number may be required, but with fewer, a dyer, whoſe quantity of work is limited, yet various, will find much inconvenience, eſpecially when by long working the dregs or grounds have ſo accumulated as to require a repoſe of 24 hours at leaſt, after raking up before the vats are fit for work again. It is on this account that deep vats are preferable to ſhallow ones; the mud ſubſides in them much ſooner, and they require cleaning out and emptying leſs frequently.

The nature of the indigo vat is ſuch, that the indigo is revived and precipitated from it whenever it comes in contact with the air. On this account, it is impoſſible to dye a piece evenly by winching or working it in the dye liquor, as in other colours. Thoſe parts of the piece which had been moſt expoſed, and on which, of courſe, moſt indigo had been precipitated, would exhibit deeper ſhades than thoſe which had been leſs. The reſerve, or paſte, alſo, for white, when ſuch had been applied, would be diſturbed and waſhed off by the uſual manipulations of dyeing.

On theſe accounts it is neceſſary to hook the pieces on a frame in ſuch a manner, that when immerſed in the vat, or taken out, the folds ſhall not touch each other. The frames are of wood, the length and width nearly of the vat, and of a depth ſufficient for the width of the goods. The horizontal ſide-rails at the bottom are fixed, and form the baſe of the frame, and are furniſhed with ſmall tenter hooks of copper an inch and a half, or two inches aſunder, to which the edge or ſelvedge of the piece is attached. The upper rails, which are alſo furniſhed with hooks, ſlide in a groove cut in the upright or corner poſts, and may be adjuſted to the width of any kind of cloth, and are retained in their place by a peg or pin. The piece is hooked in folds from ſide to ſide, and ſo evenly and tightly ſtretched, that when immerſed in the vat every part is equally and alike expoſed to the dye, and no one fold can touch another. The number of dips is regulated by the ſhade of blue required, and when finiſhed, the goods are taken off the hooks and ſubjected to the ordinary operations of waſhing, rinſing, &c. &c. The ſolution of indigo, which, as well as the veſſel that contains it, is generally called "blue vat" by the dyers, is made with lime and copperas, and in ſome caſes with the addition of a ſmall quantity of potaſh. In the due proportion of all the ingredients of this ſolution, and in the treatment of the vat, both during, and after working, conſiſt the chief art of "blue dipping," in the management of which, however, there is leſs difficulty than in any other branch of blue dyeing

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whatever. The theory is fo fimple, and the practice, to thofe acquainted with the theory, fo very obvious, that with common care and obfervation it is fcarcely poffible to err.

Indigo, as we have juft before obferved, is infoluble in the alkalies and alkaline earths, till deprived of its oxygen. Copperas is employed for this purpofe in the vats we are fpeaking of, and orpiment in others, and in the pencil blue; both thefe fubftances having a ftronger affinity for oxygen than the bafe of the indigo. On adding together, therefore, indigo, copperas, and lime, in fuitable proportions, the lime in the firft inftance decompofes the copperas, and precipitates from it the oxyd of iron: this acts on the indigo, deoxygenates it, and renders it foluble in the lime, which, if in fufficient quantity, immediately diffolves it. The oxyd of iron, which has ferved to deprive the indigo of its oxygen, the fulphate of lime formed by the union of the lime with the acid of the copperas, and any lime in excefs or more than neceffary to effect the decompofition of the copperas, and the folution of the deoxygenated indigo, all precipitate to the bottom of the vat, and there remains in folution only lime and the bafe of indigo. There are few dyers and calico-printers who do not imagine that the folution of indigo confifts of all the fubftances that have been ufed in its formation, and that the vat actually holds in folution indigo, copperas, and lime. They are not aware that folutions of thefe two latter fubftances are incompatible; they cannot exift together, one or other muft predominate, as a very fimple experiment will fhew: Mix clear lime water, and copperas water together, and an inftant precipitation will take place. As long as any copperas remains in folution, every fucceffive addition of lime water will caufe a frefh precipitate, which confifts of oxyd of iron, and fulphate of lime, formed by the union of the lime with the acid of the copperas. None of the lime remains in folution. The precipitation ceafes only when the whole of the copperas is decompofed, that is, when there is no longer any acid to form an infoluble falt with the lime. The folution will then be found to confift of lime water only. To thofe in the leaft acquainted with the principles of chemiftry, thefe obfervations may appear minute and trifling, but to thofe ignorant of thefe fimple facts (and the majority of thofe interefted in the fubject of the prefent article are ignorant of them,) the conftitution of the blue vat muft be wholly unknown, and its management, of courfe, expofed to all thofe chances of failure and derangement which muft neceffarily attend even long experience, when unaccompanied with clear and accurate ideas of the nature and properties of the different fubftances employed.

The proportions of indigo, copperas, and lime, neceffary to form a blue vat, depend both on the quality of the indigo, and on the ftrength of the folution required. The quality of indigo varies greatly, fome kinds, as the fine Spanifh and Eaft India, containing twice, and even thrice, as much colouring matter as the coarfer kinds. In general from two to five pounds of good indigo to every hundred gallons of water, are fufficient to form vats for moft purpofes. They are fometimes, but rarely, required ftronger; 40 pounds in a vat holding 800 gallons, will produce a folution of fufficient intenfity to give a black nearly, at four or five immerfions.

The finer the quality of the indigo, and the greater the proportion of copperas and lime, neceffary to effect its folution. In general, however, one of indigo, two of copperas, and two of lime, are confidered as the beft proportions, and as fuch they are given by Berthollet, who, to profound chemical fcience, unites confiderable practical knowledge, and the beft information concerning the proceffes of the dyers and calico-printers of France.

The indigo is previoufly ground in a mill with water, till it is reduced to a fmooth pafte of the confiftence of cream. In its ordinary ftate of aggregation, it is fcarcely, if at all, attacked by copperas and lime; all therefore that has efcaped the action of the mill, and is put into the vat in a lumpy or imperfectly ground ftate, may be confidered as totally loft. Every precaution therefore fhould be employed to guard againft this, and when by rubbing it between the fingers, or on a pane of glafs, it appears fine and fmooth, and free from fmall hard, gritty particles, it may be removed from the mill, mixed up with four or five times its bulk of water, and poured through a fine fieve into the vat. Any lumps which may have efcaped grinding are thus retained, and may be returned into the mill with frefh indigo.

The vat having received its charge of indigo, and been filled up with clean water, the copperas is next added. It is beft and moft fpeedily diffolved by fufpending it in a wicker bafket at the furface of the vat; it is fometimes thrown in, and will, in that cafe, when it is in large lumps, oftentimes lie undiffolved at the bottom of the vat for weeks, in fpite of frequent and even daily ftirring. When the whole is diffolved, the lime is added, and the vat well raked up, till all its contents are intimately mixed, the lime diffolved, and the copperas decompofed. The action of oxyd of iron upon indigo requires time, and alfo repofe; after the firft raking, which fhould be continued during half an hour at leaft, it is beft to fuffer the vat to remain two or three hours undifturbed; the indigo and oxyd of iron fall down to the bottom, and are thus brought more within the fphere of chemical action, than when floating in the whole mafs of water in the vat.

The choice of copperas is not a matter of indifference, as on its peculiar ftate depends its fitnefs or not for deoxygenating indigo. Sulphate of iron exifts in two ftates dependent on the quantity of oxygen combined with its oxyd. At its minimum of oxydation, it forms a green folution, and when cryftallized, a green falt, the green vitriol, or copperas of commerce; at its maximum, or fecond ftate of oxydation, it forms an orange-coloured, uncryftallizable folution poffeffing very different properties from the former.

The green folution is diftinguifhed by its great avidity for oxygen, and its difpofition to pafs to the orange, or fully oxygenated ftate. It is this affinity for oxygen that fits it for the folution of indigo. The copperas of commerce is however not unfrequently a mixture of the two falts or oxyds a portion of it either having acquired oxygen, whilft in a ftate of folution before cryftallization, or more frequently perhaps by too great expofure to the air afterwards.

In this latter cafe its furface is covered with a reddifh orange ruft, and a portion of the falt is rendered ufelefs for the blue vat having already acquired its maximum of oxygen. The chief difference in the quality of copperas, is however in the more or lefs perfect faturation of the acid, forming two diftinct falts, which were known and diftinguifhed by manufacturers long before chemifts were acquainted with their exiftence. The firft, and leaft efteemed, is a pale emerald green, and contains a great excefs of acid; the other, which is more fully faturated with iron, is a deep full green, and is univerfally preferred, efpecially for indigo and China blue vats. Some calico-printers imagine that the reddifh coloured copperas is the beft, or, as they fay, the *ftrongeft*, a prejudice which the manufacturer very eafily accommodates, by fprinkling a little fine fifted quick lime over the furface, which foon covers it with a coat of orange ruft.

The lime ufed for the indigo vat fhould be quick. Fallen lime,

lime, when not too old, and too long expofed to the air, is the beft. It fhould be well fifted, and freed from ftones and lumps.

After two or three hours repofe, the vat fhould be again well raked. It will now exhibit figns of incipient folution; inftead of black, it will appear of a dark bottle green, and the furface will break into marbled veins of blue. Thefe appearances will increafe each time the vat is raked, which fhould be three or four times a day during two days. At each time the colour of the vat will brighten, and get paler, the marbled or veined appearance become more marked and ftrong, and when the folution is compleat, and ready for working, the colour, when raked up, will be a yellowifh green. After a repofe of ten or twelve hours, to allow the dregs time to fubfide, the vat is ready for work.

It is the practice of fome dyers to add potafh in equal quantity with indigo to the vat. The only advantage arifing from this, is greater concentration of the folution than can be obtained by lime alone; but this is feldom required, and never, indeed, for the purpofes of calico-printing; on the other hand, if potafh be added to a vat containing little indigo, and calculated only for the paler fhades of blue, the colour it will produce is lefs intenfe, than when lime alone is ufed, and the hue not at all improved.

It was formerly the practice to grind the indigo with a folution of cauftic potafh, and boil it in a ftrong lye, before adding lime and copperas, and pouring it into the vat. A great deal of trouble, and no advantage whatever attends this procefs, which is now univerfally difcarded, except by thofe who regard all improvements as innovations.

Of the management of the vats both during work and after, we fhall have occafion to fpeak whilft treating of particular kinds of work; which, after the preceding general view of the nature of the proceffes, and the mode of preparing the indigo vats, we fhall now proceed to.

Of dark Blue ground, and white.

Dark blue grounds, with fpots or figures of white, were amongft the firft attempts at calico-printing in the Eaft, and were produced, as we have before remarked, firft, by tying knots on the part intended to remain white, and afterwards by covering them with a compofition of wax. This procefs was fubject to great inconveniencies, arifing from the unmanageable nature of the compofition, which required keeping fluid by heat during the time it was applied, and could only be ufed in certain plain figures, fuch as round fpots, ovals, &c. The defigns were of courfe rude and fimilar, little variety being practicable where lines, ftalks, leaves, or any object more figured than a fpot or oval, could not be obtained.

At what time the pafte or referve now in general ufe was introduced, is not known; we are indebted for it to the continent, from whence, indeed, our firft knowledge of calico-printing was derived. Though the formulæ for this pafte differ much, every blue dyer almoft, preparing it in a mode peculiar to himfelf, yet they are all effentially the fame, a folution of copper of one kind or another being the principal ingredient.

If a folution of fulphate, acetate, nitrate, or indeed any foluble falt of copper, properly thickened for printing, be applied to cloth, and when dry, immerfed in the blue vat, the part fo covered will refift the action of the dye, and remain white. This does not arife from the mere mechanical refiftance of the pafte, which prevents the folution of indigo from entering the fibres of the cloth, but from the chemical action of the oxyd of copper, which imparting oxygen to the indigo, reftores it to its former blue ftate, in which it poffeffes neither folubility in lime, nor difpofition to unite with the cloth. This effect of the oxyd of copper may be rendered very apparent, by pouring a folution of it into a folution of indigo, which is generally of a yellowifh green, or when viewed by tranfmitted light, of the colour of fmall beer. The inftant the two folutions are mixed, the indigo is revived, and precipitated in its original blue ftate, having acquired from the copper that principle of which it had been deprived by the folution of fulphate of iron. Every pafte, or referve, therefore, for dark blue grounds, muft neceffarily contain oxyd of copper; we give the following formulæ as moft approved of any in ufe.

I. To 1 gallon of water add,
4 lbs. of fulphate of copper,
12 lbs. of pipe clay.

Boil the whole up into a thick pafte, ftrain through a cloth, and add to it half a pint of fulphuric acid, and five pints of thick gum water. Mix all well together, and ftrain again before printing.

II. To 1 gallon of vinegar add,
$1\frac{1}{2}$ lbs. of verdigreafe,
3 lbs. of fulphate of copper.

Diffolve them over the fire, and thicken with 12 lbs. of pipe clay, finely ground.

If the pafte is not fine and fmooth, run it through the mill, and add to it, whilft hot, 8 ozs. of linfeed oil, and two quarts of thick gum water. Strain it carefully through a cloth before printing.

III. To 1 gallon of water add,
2 lbs. of verdigreafe,
3 lbs. of fulphate of copper,
3 lbs. of nitrous acid,
15 lbs. of pipe clay.

Boil them well in a copper pan, and, if neceffary, grind them fmooth, and add three quarts of thick gum water. Strain the whole very well before printing.

The firft of thefe formulæ contains fulphate of copper only, the folubility of which is increafed by the addition of a little fulphuric acid, which prevents the cryftallization of the pafte. The fecond, which is ftronger, contains alfo acetate of copper, and the third, in addition to both thefe falts, contains a portion of nitrate of copper formed by the action of the nitrous acid on the verdigreafe. This is a very powerful pafte, and capable of refifting the vat a long time, and forming a white upon a ground nearly black.

The pipe clay ufed in thickening, is not merely ufeful in giving due confiftence and body to the pafte, fo as to render it eafily workable, but is very efficacious in refifting the dye; the fame folution, thickened with gum only, will fcarcely bear three immerfions, but with the allowance of pipe clay here directed, will ftand ten or twelve. No more gum, indeed, fhould be added than is juft fufficient to break the adhefive nature of the pipe clay, and prevent it clogging up the print or block.

In working this pafte the mall, or mallet, fhould be ufed very lightly, or not at all, if the pattern will admit of it. A gentle tap with the hand, fo as to leave the pafte wholly on the furface of the cloth, will produce the beft work.

The cloth may be dipped an hour or two after printing, if required, but the whites are feldom fo good as when kept three or four days. The pafte gets hard and firm, part of the acid evaporates, and the folution of copper becomes more intimately incorporated with the cloth.

Dark blues, in general, require from five to ten dips, or immerfions, according to the fhade of blue required, or the ftrength of the vats employed.

If the vats are ftrong, five, or at moft fix dips, will give a

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very dark blue, almoft black, the intenfity of which will be little increafed by further dipping; the labour is greatly abridged by employing ftrong vats, but the whites are liable to great injury, as the folution of indigo, when concentrated, acts very powerfully on the pafte. On this account the firft vat fhould invariably be the weakeft of the feries, and never ftronger than is fufficient to produce a full ftrong blue at feven, or even eight immerfions. The fecond and third vats may be ftronger, and fo on to the laft, which may be the ftrongeft of all. Dark blues may be dipped and finifhed in the fame vat, but it is more convenient to pafs them in fucceffion through a feries difpofed in a line in the manner we have before defcribed.

When the piece is well hooked, and the frame ready, the vat muft be well fkimmed before the piece is entered. The furface of a blue vat is always covered with a film of revived indigo, more or lefs thick, according to the ftrength of the vat. This film it is neceffary to remove before the frame is immerfed, otherwife the revived indigo, which is no longer in folution, attaches itfelf, and adheres to the cloth in patches, producing unevennefs in the dye, efpecially in the firft vat. When fkimmed, the furface of the vat is dark green, but the blue film re-appears in a few minutes; it fhould not be removed, therefore, till the frame is ready for immerfion.

In five or fix minutes the cloth has fully imbibed the dye, and little advantage is gained in general by keeping it longer in the vat. The frame is then lifted out, and placed flantwife in fuch a manner, that all the liquor which drains from the piece falls down into the vat again. When taken out, the cloth appears of a pale yellowifh green, if the vat is weak, but if ftrong, more inclining to amber. This colour gradually changes, as the indigo, by abforbing oxygen from the atmofphere, becomes revived, and in five minutes the cloth appears uniformly blue; it is then ready for another immerfion. Six minutes *in*, and fix minutes *out*, is a good general rule for dipping dark blues, as the cloth will in that time have acquired the full effect of the vat, and *the green will alfo go off* in little more than five minutes, though the vat be very ftrong. The bottom edge of the piece retains the green hue the longeft, becaufe it is longeft in draining from the liquor; care muft be taken, therefore, never to immerfe a piece till the bottom edge has been examined, and found perfectly ready for the dip. The confequence of entering a piece into the vat whilft the bottom edge is green, is, as might be fuppofed, that the edge will be the paleft, the indigo not having been revived and precipitated upon it equally with the reft of the piece.

In dipping dark blues, the firft dip is the moft important; and if it fails, the work is inevitably ruined. Firft, if the vat be too ftrong, the whites will never be clear and fharp; fecondly, if for want of due preparation the cloth does not uniformly receive the dye, the goods will fcarcely ever be even when finifhed. Thirdly, if either from the pafte being too ftrong, or the vat too weak, or not in proper order, the impreffion ftarts, or runs at the firft immerfion, the ground is fure to be freckled and uneven, and the whites bad.

Againft the firft fource of error, the knowledge of the fact ought to be a fufficient guard; but if unavoidably it fhould happen that the leading vat is too ftrong, there is no other remedy than fhortening the time of the dip, and keeping the frame in four or five minutes in lieu of fix, till the vat becomes reduced in ftrength.

Imperfect bleaching, accidental impurity in the cloth, and long and partial expofure to heat and air, are amongft the caufes which contribute moft to prevent the cloth from receiving the blue dye.

It is the practice with many printers to give the cloth intended for this purpofe an extra preparation, either by boiling in a lye of potafh, or a folution of common falt. If the regular bleaching has been perfect, the firft is wholly unneceffary, and the fecond abfolutely ufelefs.

Cloth that has been well bleached may, by long keeping, and partial expofure to the air, duft, and other accidental impurities, become fo unfit for dipping, as to require fome extra preparation. In this cafe the modes we have fpoken of may be ufeful inafmuch as wafhing, foaking in hot water, fqueezing, and the other attendant operations are ufeful, but clean, well bleached, and recently bleached cloth has no need of any fuch preparation.

If the pafte be too ftrong, that is, if it contains too much fulphate, acetate, or nitrate of copper, it is liable to ftart or run in the firft vat, efpecially when laid on in large bodies. This evil, if not too great, may be remedied by gently moving the frame up and down during the firft two or three minutes after it is entered. It may alfo arife from the vat being too weak, and confequently containing too little lime in folution, and may fometimes be remedied by the addition of more lime. If in fpite, however, of the motion of the frame, the addition of more lime, or of greater ftrength to the vat, the pafte ftill continues to run, it is a fign the folution of copper is too ftrong, and the quantity muft immediately be diminifhed.

When the green is gone off after the firft dip, the frame is then moved on, and dipped in the fecond vat, taking care to fkim it well before the piece is entered. In this way, after each immerfion, the frame is moved on to the next fucceeding vat, till it has received the number of dips required. This, as we have before obferved, depends on the ftrength of the vat, and the fhade of blue wanted; but as, during the procefs of dipping, the vats continually get weaker, the goods, after a certain time, will require an additional immerfion, or even two or three, to get them up to the ftrength of the firft pieces that were entered.

The ftrength of a blue vat is not exhaufted in the fame manner as the weld or madder bath, by the abftraction of the colonring matter from the folution, by the fuperior affinity of the mordant on the ftuff. When a piece of cloth is immerfed in the indigo vat, it becomes penetrated in five or fix minutes compleatly with the dye, and will gain nothing, by being fuffered to remain longer than is neceffary for this purpofe. When taken out, it carries with it no more indigo than is contained in that quantity of folution which it has imbibed, and carries out of the vat. But the inftant the frame is lifted out, the liquor begins to drain from it back again into the vat, and pours down in fmall ftreams, thus expofing the folution compleatly to the atmofpheric air. The indigo is in confequence revived and precipitated, fo that the liquor which drains from the piece, and falls down into the vat, is for the purpofe of dyeing, no better than fo much water. Every frame that is entered thus effecting the precipitation of the colouring from matter two, three, or four gallons of the folution, the vat, efpecially the leading one, foon becomes reduced in ftrength. The fecond, third, and fucceffive vats, are weakened in the fame manner, and alfo by the exhaufted liquor of the pieces, which at every dip after the firft, is exchanged, as it were, for the frefh and ftrong folution of the vat it is immerfed in.

When the goods have received the laft dip, and have acquired their full fhade of colour, they are taken off the hooks, and well winched in clean water; they are then, by the fucceffive operations of wafhing and hot watering, repeated as occafion may require, freed from the pafte, and rendered as clean as poffible before going into the fours.

Souring is neceſſary to free them from the laſt remains of the paſte, and give a brightneſs and finiſh to the whites. A ſolution of ſulphuric acid, weak enough to be borne in the mouth without inconvenience, is ſufficient to diſſolve what oxyd of copper is left in the cloth after good cleaning. The goods are immerſed in this ten or fifteen minutes, after which they are well waſhed and hot watered, and when dry are finiſhed, or ready for any ſucceeding operations. The excellence of this kind of work depends on the clearneſs and purity of the white, and on the fulneſs and evenneſs of the blue. The directions we have given are, with ordinary care and obſervation, ſufficient for the attainment of this.

When the vats have become exhauſted by working, they muſt be *refreſhed*. If a vat contains a tolerable charge of indigo, copperas, and lime, and has been worked only once, raking up alone will be ſufficient to put it in a ſtate for working again. When again exhauſted, copperas and lime muſt be added to diſſolve the revived indigo. The quantity muſt depend upon the ſize of the vat, and the ſuppoſed quantity of indigo which it contains. From 20 to 40 lbs. of copperas, and three-fourths of that quantity of quick lime, may be added at once to a vat of 1000 gallons, or thereabouts, and ſome idea may be formed of the effect which this ſhould produce, by recollecting that one pound of indigo requires for ſolution about two pounds of ſulphate of iron. It is proper always to have an exceſs of quick lime in the vat, but it is wholly unneceſſary to make thoſe frequent additions of lime without any thing elſe, which is the practice of many blue dyers. It ſerves no other purpoſe than to fill the vat ſpeedily with dregs, which ought to be avoided as much as poſſible, as when they are accumulated to a certain pitch, it is neceſſary either to take them out, or ſuffer the vat to repoſe from 36 to 48 hours before it is fit for work after raking.

If equal quantities of copperas and lime have been uſed when the vat was formed at firſt, and three parts lime added for every four of copperas afterwards, any other addition of lime is wholly uſeleſs. Some idea may be formed of the ſtate and condition of a vat, by obſerving its appearance when raked up. In general, if it looks dark green or black, it may be preſumed it contains a quantity of revived or undiſſolved indigo, and copperas and lime are therefore neceſſary; this blackiſh appearance may nevertheleſs be occaſioned by a very great exceſs of copperas, or ſulphate of iron, the oxyd of which, when recently precipitated by lime, is dark green; as this, however, could ariſe only through great ignorance, or accident, it is not often likely to be the caſe, as the quantity of copperas required to produce this effect muſt be very great indeed.

When a vat rakes up yellow, or very pale yellowiſh green, it is ſuppoſed by ſome to contain too much copperas, and muſt be corrected by the addition of more lime. It is hardly correct, as we have before obſerved, to ſay a vat contains an exceſs of copperas, ſince this ſalt cannot exiſt in ſolution with lime. A vat may want lime, and in this caſe it will be very weak, of a pale yellowiſh green, produce a very feeble blue, and the paſte will invariably *creep*, to uſe the dyers' phraſe, or in other words, will run, and loſe the ſharpneſs and ſmartneſs of the impreſſion, the moment it is entered in the vat. This may be the caſe at the time the vat contains a quantity of revived indigo alſo, and rakes up black, ſo that no certain concluſion can be drawn from the yellowiſh appearance aforeſaid.

If a vat be weak, the froth which forms at the top during raking, is pale ſky blue; the ſurface does not ſpeedily break into marble veins, nor is it ſoon covered with a blue film. A ſtrong well conditioned vat, on the contrary, when raked up, becomes covered directly with a permanent and copious froth, the colour of which varies from a deep blue, when the vat is of ordinary ſtrength, to a bright copper colour, which is always characteriſtic of a very ſtrong ſolution, and the ſurface, when ſkimmed, is in an inſtant covered with a thick film of revived indigo. This film, and the deep blue and copper coloured froth, is the beſt and pureſt of the indigo, and is called the *flower of the indigo* by the old dyers. In ſkimming, great care muſt be taken that this is carefully preſerved, and returned again into the vats at the time they are refreſhed.

When a vat becomes ſo exhauſted that further additions of lime and copperas have no effect in increaſing the ſtrength, freſh indigo muſt be added, with the proportions of lime and copperas before indicated.

If a vat remains ſeveral weeks unworked and without raking, it will abſorb oxygen enough from the air to precipitate the indigo from the ſolution, ſo that, to the depth of 10 or 12 inches from the ſurface, it will conſiſt of lime-water only, and muſt be well raked up before it is worked.

When the dregs have accumulated ſo much as to prevent the vat from clearing in 24, or at moſt 36 hours, and when the frame begins to touch the mud during work, it is time then to empty it out, taking care to doſe the vat well with lime and copperas, ſo as to get out all the indigo before the dregs are thrown away as exhauſted.

Of Pale Blue.

Pale blues are, in general, produced at a ſingle dip; they require leſs indigo and labour than the preceding ſtyle of work, but more care and management to do them well. They are liable to be uneven and ſpotted in the ground, and the proper tone and ſhade of colour is a matter of great importance, and alſo of no ſmall difficulty.

We ſhall ſpeak firſt of pale blues and white, intended to be finiſhed up with after-colours or not.—The paſte for pale blue is preciſely ſimilar to that for the dark blue we have been treating of, except that it need not be ſo ſtrong. Two pounds of ſulphate of copper, diſſolved in a gallon of water, and thickened with pipe-clay and gum, in the manner of the three paſtes we have already given, will form a very good reſerve for pale blue. Any other ſolution of copper will be equally efficacious, but the ſulphate, as being the cheapeſt, may be conſidered as the beſt.

The preparation, or rather the condition of the cloth, is a matter of the greateſt importance in pale blue dipping. If imperfectly bleached, or ſtained or impregnated with any earthy or metallic ſubſtance that will obſtruct the entrance of the dye, the blue will infallibly be uneven. A difference in the quality of the cotton, in the fineneſs of the weft, or in the hardneſs of the twiſt, of which the cloth is made, will occaſion conſiderable variation in the ſhade of blue, and defeat every attempt, on the part of the workman, to do juſtice to his work. To guard as much as poſſible againſt this, the cloth, in the firſt place, ſhould be ſelected purpoſely, rejecting all thoſe pieces which ſhew unevenneſs in weaving, or variation in the quality of the materials.

The goods ſhould be in the beſt poſſible ſtate for printing; freſh from the bleach-ground, carefully kept from duſt or dirt of any kind, and ſufficiently damp to make them take a ſtiff calendering. As ſoon after printing as convenient, they ſhould be removed from the warm ſhop to a cool ſituation, where they will not get parched and dry, and dipped at furtheſt the following day.

All theſe precautions, however, are inadequate to ſecure an even and level ground, without recourſe to the improved

method of dipping, for which we are indebted to the calico-printers of London.

This improvement, whether confidered with reference to the particular ftyle of work, of which we are now treating, or its application to other branches of blue dyeing, the moft important that has lately been introduced, confifts in dipping the goods in clear lime-water before they are entered in the blue vat.

If the piece becomes uniformly wet throughout, and fhews no ftreaks or patches of white, it may fafely be transferred to the blue vat as a piece that will take an even dye. If, however, after remaining five or fix minutes in the lime-vat, there are parts which are not compleatly wet, it muft be dipped five or fix minutes longer, and again taken out and examined. All thofe pieces which, after two, or, at moft, three immerfions, ftill refufe admiffion to the lime-water, are rejected as unfit for dipping, and the pafte being removed by fouring, are appropriated to fome other courfe of work to which they are better adapted.

The vat for pale blues is, in general, the fame as for the dark grounds, care being taken to felect one that will give the fhade of blue required. It is ufual to employ the old and nearly exhaufted vats for this purpofe, but the blue is never fo bright and lively as when frefh indigo, and that of the fineft quality, is employed.

The hue is greatly improved by fouring, a neceffary operation, to free the goods from the pafte, and ftill further, by winching them in a folution of white foap 10 or 15 minutes, at a heat of 120°.

Mr. Haufman obferves, that if the goods are plunged in a weak folution of fulphuric acid immediately on coming out of the vat, the blue is more lively and full than when previoufly rinfed and wafhed.

Mr. Chaptal employs for pale blue grounds without white, and for green grounds alfo, a vat compofed of indigo, potafh, lime, and orpiment. This folution, which is the fame precifely as the pencil-blue of the calico-printers, affords a much more delicate colour than that with lime and copperas, the caufe of which is not clearly underftood, though it moft probably arifes from the different degrees of deoxydation produced by the two fubftances.

This vat is formed by boiling 10 lbs. of fine Spanifh indigo, 10 lbs. of potafh, 20 lbs. of quick-lime, and 5 lbs. of orange orpiment, in about 30 gallons of water, and pouring it, when the folution is compleat, into the vat containing about 800 gallons of water, and 20 or 30 lbs. of lime. When worked, it muft be raked up well the inftant before the frame is entered, and when exhaufted, refrefhed with additions of the fame folution.

If a piece of cloth, printed with the referve or pafte before defcribed, be dipped in this vat, the copper becomes precipitated and fixed by the fulphuretted hydrogen which it contains, and produces a brown ftain inftead of a white. It is poffible, however, with extraordinary care and management, to fucceed in obtaining good whites in this vat, and the following procefs may be employed with fuccefs, though it is ftill capable of further improvement.

Prepare a pafte by diffolving 2 lbs. of fulphate of copper in one gallon of acetate of alumine, or the common aluminous mordant of the calico-printers, add to it 1 lb. of nitrous acid, and 8 lbs. of pipe-clay; boil well and ftrain it through a fine cloth, and when cold, add as much thick gum-water as is barely neceffary to give it the due degree of confiftence for working. In printing this pafte the mallet fhould never be ufed, a gentle tap with the hand, if the block is true and in good order, will leave the pafte, as it fhould be, wholly on the furface of the cloth. Dip fix or eight minutes in the lime-vat, and when taken out, fuffer the piece to drain two or three minutes before entering in the blue vat. The vat fhould be ftrong enough to produce the fhade required in two minutes, after which the frame fhould be withdrawn and plunged inftantly in a vat of clear water, and moved and agitated therein till the green goes off. When wafhed and foured, if the work has fucceeded, the white will be clear and prominent, and the blue the fineft that can be produced on cloth. It is remarkable, that a ftrong vat produces better whites than a weak one, on this account care muft be taken, that the folution be of a proper ftrength. The utmoft nicety is required in preferving the cloth for this vat from duft or dirt of any kind. Goods that have been long bleached, and not carefully fecluded from the air, are wholly unfit. They ought, in fact, to be taken frefh from the fours, for every, even the fmalleft particle of metallic fubftance that is in the cloth, when dipped in this vat, will produce a brown ftain, and if the cloth is uniformly tainted with it, entirely ruin the blue.

In dipping pale blue grounds, it is fometimes neceffary to protect colours that have been previoufly applied, from the effect of the blue, as red or yellow flowers for example, which would otherwife become purple and green. The folutions of copper cannot be employed for this purpofe, as they injure the colours, efpecially madder reds, or purples, very much, and are not wholly removed without fouring, an operation which goods of this defcription cannot be fubjected to.

The referve moft commonly ufed, is fimply a pafte of pipe-clay or Spanifh white, boiled to a proper confiftence, and mixed with an equal quantity of thick gum-water. This does not affect the colours upon which it is applied, and is eafily removed by hot water and wafhing; but as it oppofes merely a mechanical refiftance to the dye, and fails the moment it becomes foftened, it will not bear a dip of more than one minute or two. This is an inconvenience of great magnitude, when the pale blue ground is much expofed, and not covered with any kind of defign calculated to hide unevennefs in the dye. The following pafte is recommended and ufed, by fome, as capable of refifting much longer than the former:—

One pound of finely ground pipe-clay,
Four ounces of gum-arabic,
Two ounces of fuet,
Two ounces of wax, and
One ounce of refin.

Boil all thefe ingredients together, in as much water as will form a pafte of fufficient confiftence not to run. This pafte can only be applied with the pencil, and in large maffes. It is removed with great eafe by hot water and wafhing, without any injury to the reds, or other colours it has covered.

The folutions of lead poffefs the property, though in a much fmaller degree than copper, of refifting the indigo vat, and may be ufed with advantage for pafting reds and other colours, which are but little injured by them. We have feen the following pafte ufed with great fuccefs:—

Diffolve two pounds of acetate of lead in a gallon of water, add two ounces of tallow, two of wax, and two of refin, and as much pipe-clay and gum as will make it of a proper thicknefs for printing or pencilling. This pafte will refift a dip of three or four minutes; it muft, however, be laid on in good bodies, and fucceeds better with the pencil than block.

In pale blue grounds, with black and white figures, &c. it is often neceffary to print both the black and the pafte

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at the ſame time, to ſave the expence and trouble of after-grounding. The black for this purpoſe is generally chemical black, for an account of which we muſt refer to the article COLOUR-*making*. The ſulphate of copper paſte is generally uſed, but as the goods cannot, on account of the black, be paſſed through the ſours to free them from the oxyd of copper, which imparts a greeniſh hue to the white, it is better to employ the nitrate of copper, which is cleared by hot watering and waſhing much more compleatly.

If the patterns contain very large maſſes or bodies of black, the acetate of iron, or what the printers call black colour, muſt be uſed, increaſing the ſtrength to double that required for an ordinary black; ſo that when the goods are dipped, and as well cleaned as poſſible, by repeated waſhing, &c. they may be paſſed through water rendered ſlightly acidulous with nitrous, or what is ſtill better, acetous acid, without materially impairing the ſtrength of the mordant.

The white is compleatly freed from the oxyd of copper by this ſlight ſouring, and takes no ſtain in the dye copper, when the black is raiſed with ſumac and logwood.

It is proper to obſerve, that the goods, before ſouring, ſhould be compleatly freed from all ſuperfluous paſte, either of the black or white; and the iron, by repeated hot watering, at a temperature of 140°, oxygenated as highly as poſſible. In this ſtate it is ſcarcely ſoluble, either in nitrous or acetous acids, and will bear weak ſolutions of them 15 or 20 minutes.

Of Reſiſting Mordants.

When a pale blue is intended to exhibit other colours on the ground, as red, pink, yellow, orange, &c. the paſte or reſerve is often mixed with a mordant capable of producing theſe colours in the dye copper.

The common paſte alone will produce a yellow with weld, quercitron bark, fuſtic, &c. if the piece be ſimply rinſed and waſhed before dyeing.

In this caſe the oxyd of copper which remains in the cloth attracts the colouring matter, and though it is greatly inferior as a mordant, to the acetate of alumine, yet, with care and management, it is capable of producing, with weld, a pale and beautiful yellow. The only difficulty conſiſts in getting the colour even, and this is beſt attained by employing thoſe ſolutions of copper which are moſt ſoluble, and uſing them ſomewhat ſtronger than is merely neceſſary to reſiſt the vat.

When dipped, the goods ſhould be well rinſed in the river 15 or 20 minutes, and afterwards rinſed off in a copper of warm water, with a ſhovel full of cow-dung. Too much dung, or too great heat, will injure the yellow, the temperature ſhould not exceed 100°, and after winching again in the river, they ſhould be dyed at a heat conſiderably below this, if weld is uſed, and not exceeding 75 or 80 if dyed with bark.

Oxyd of copper, when dyed at a high temperature, invariably becomes dull, eſpecially when bark or ſumac are employed. With weld there is leſs riſk of injuring the brightneſs of the yellow, but long continued heat impairs it greatly.

This mordant does not at all anſwer for reds; with madder it affords a dull wine-coloured dye, and with brazil, peachwood, and cochineal, dull, heavy colours, more inclining to pompadour or chocolate than red. When mixed, even in ſmall proportions, with the common aluminous mordant, its effects are very viſible, when dyed with any of the above-mentioned drugs.

It is nevertheleſs employed for deep full reds, upon pale blue ground, according to the following formula, which is excellent for a yellow or orange:—

Diſſolve 2 lbs. of acetate of lead, and 2½ lbs. of alum, in a gallon of water; pour off the ſolution from the precipitate, and add 8 ozs. of ſulphate of copper; thicken with 1½ lb. of ſtarch, and 4 lbs. of fine pipe-clay. When cool, ſtrain the paſte through a cloth or ſieve, and give the goods ſix days age before dipping. Dip three minutes in a well-conditioned vat, and transfer the frame from thence inſtantly to the water-vat.—Rinſe off, and prepare for dyeing in the ſame manner as before directed.

The following formula is in uſe for reſiſting reds or yellows:—Diſſolve in one gallon of warm water 3½ lbs. of acetate of lead, and 5 lbs of alum; thicken it (with the precipitate in) with the beſt Senegal gum, and add 2 ozs. of white arſenic, ground as fine as flour; 4 ozs. of common ſalt, and 4 ozs. of corroſive ſublimate. Give the goods two or three days age before dipping, and keep them from three to five minutes in a good vat, or leſs, if you can get the ſhade of blue required. Plunge them in the water-vat the inſtant they are taken up, and rinſe and finiſh as before.

Bark or weld drabs and olives, as they do not ſo ſoon ſhew any ſlight tinge of blue which may have penetrated the paſte, may be ſimply thickened with good ſtarch, and from 12 to 16 ozs. of ſuet per gallon, to enable them the better to reſiſt the vat. If this ſhould not ſuffice, from 2 to 4 ozs. of ſulphate of copper may be added, but it muſt be obſerved, that this will change the hue of the drab, and make it more an olive. A little pipe-clay, not more than 2 lbs. per gallon, may be employed alſo with advantage. It is very efficacious in keeping out the dye, and, in ſo ſmall a quantity, will not materially affect the fullneſs and evenneſs of the mordant.

Solutions of tin, more eſpecially the nitro-muriatic, are employed by ſome calico-printers, in conjunction with the aluminous mordant, for reſiſting reds and yellows. They are not very powerful in keeping out the blue, and, with madder, afford but feeble colours: the yellow they produce is bright, but pale.

In general, thoſe ſolutions which are moſt efficacious in reſiſting the vat, are the worſt mordants, as thoſe of copper for example; but as they will bear a long dip, and the evenneſs of the blue is thereby enſured, this advantage, in one colour, is conſidered as ſufficient compenſation for want of brilliancy in the other. The common aluminous mordant, thickened with gum and a little pipe-clay, or with ſtarch and pipe-clay, forms infinitely the beſt mordant, and will reſiſt the vat a few ſeconds, but not ſufficiently long to make the work ſecure. The recent improvement in this kind of dipping, however, by the uſe of warm vats, has removed a great many difficulties, and enabled ſome calico-printers to produce work of very ſuperior merit.

The great and the only advantage attending warm vats, is the celerity with which the dye penetrates the cloth; ſo that all the effect of a ſix minutes' dip in a cold vat, may, in a warm one, be obtained in the ſame number of ſeconds. The frame, in fact, is plunged in only for a moment, and inſtantly taken up; and, in this ſhort ſpace, the vat, however ſtrong, has not time to penetrate the paſte or mordant.

The vats may be variouſly heated, as beſt ſuits the nature of the eſtabliſhment. Steam affords the moſt eaſy and efficacious means, and may either be thrown into the vat through a pipe and valves, in which caſe the ſteam itſelf is condenſed in, and mingles with the ſolution of indigo, or the vat may be in part ſurrounded with a caſing, into which the ſteam may be admitted, and give out its heat, without filling the vat with condenſed water.

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The firſt is the ſimpleſt and moſt economical mode; but it requires certain precautions which the other does not. In the firſt place, before the ſteam is admitted into it, the boiler ſhould be *blown*, that is, compleatly emptied of air; for if it paſſes along with the ſteam into a vat, the indigo will be revived, and precipitated from the ſolution, and the vat rendered unfit for dipping. In the ſecond place, if the vat, when cold, is only of the proper ſtrength, the admiſſion of ſo much ſteam, and conſequently of condenſed water, as will be neceſſary to raiſe it to the temperature required, will weaken it conſiderably; and laſtly, ſome inconvenience may ariſe from this great accumulation of condenſed water, unleſs due allowance be made before it is admitted, and care be taken never to turn it in when the vat is full.

The ſecond mode is ſubject to none of theſe inconveniences. The vat can neither be weakened by air from the boiler, nor by condenſed water, ſince the heat is tranſmitted wholly through the caſing. The expence, however, is very conſiderable; ſtill it is greatly preferable to the plan which ſome printers have adopted, of conſtructing caſt iron vats, and heating them by furnaces built underneath.

The temperature at which they can be employed, varies according to the kind of work, and the power which the paſte poſſeſſes of reſiſting a hot vat.

From 60 to 80° will be ſufficient for moſt purpoſes, and a vat of tolerable ſtrength will, at the latter temperature, produce a good blue in ten or fifteen ſeconds.

Of coloured Paſte.

By mixing both colouring matter and mordant with the reſerve, we obtain paſtes which at the ſame time communicate colour to the cloth, and reſiſt the blue; not only ſaving the neceſſity of dyeing, but enabling us to form combinations of colours, incompatible by any other proceſs. This branch of blue dipping is ſtill in its infancy, and little has yet been done towards its perfection. We ſhall therefore have little elſe to do in treating of this part of our ſubject, but to ſtate the few facts on which it is founded, and ſuggeſt ſome hints for its future improvement.

If a ſolution of ſulphate or acetate of iron be mixed with the reſerve or paſte for white, it will, when dipped and rinſed off, leave a buff or orange ſtain, not very ſtrong, indeed, nor always very even; but applicable and uſeful in ſome caſes. This paſte has been long known and employed.

If inſtead of acetate of iron a ſtrong decoction of bark, or French or Turkey berries, be mixed with the reſerve, a yellow will be obtained, full, but leſs bright, than when raiſed in the weld copper.

Thus by combining different colouring matters with the mordants proper for fixing them on cloth, and alſo with ſubſtances which have the property of reſiſting the blue dye, various coloured paſtes will be obtained.

The ſolutions of tin, from their forming combinations with moſt colouring ſubſtances which are but little affected by acids, ſeem likely to be of conſiderable uſe in the compoſition of paſtes of this deſcription. The muriate of tin deſtroys the reſiſting power of ſolutions of copper by de-oxygenating them; but the nitro-muriate, or highly oxygenated ſolutions, produce rather a contrary effect; they are theſe which ſhould therefore be tried.

Of China Blue.

The proceſs for China blue dipping conſiſts in applying finely ground indigo, in its crude and undiſſolved ſtate, upon the cloth, and fixing it by alternate immerſions in ſolutions of ſulphate of iron and lime.

The ſame thing takes place upon the cloth, that is effected in the ordinary blue vat when indigo is diſſolved; in both caſes the indigo is de-oxygenated, and prepared for ſolution by the copperas, and afterwards diſſolved by the lime.

The different ſhades of colour in China blue dipping are produced by reducing, more or leſs, the ſtandard colour, which is prepared in the following manner.

1ſt. Grind in a metal pot with balls, or by any other contrivance, 10 lbs. of good indigo, 8 lbs. of good copperas, and 5 lbs. of orpiment, with 2 gallons of water; when the whole is nearly ground, add two quarts of very thick ſolution of gum ſenegal, and grind a few hours longer.

2d. Prepare a ſolution of ſulphate of iron by diſſolving 2 lbs. in a gallon of water, adding a quarter of an ounce of pot-aſhes, and ſuffering the precipitate, if there is any, to ſubſide. Reduce the ground blue (No. 1) with as much of this clear ſolution (No. 2) as will bring it to a proper conſiſtence for working, and print with this for the dark full blue. When dipped, this colour will have nearly the effect of black, eſpecially in ſmall bodies.

For pale blue, reduce the ſtandard with 10, 15, or 20 meaſures of the ſolution of copperas, and an equal quantity of acetate of iron, or common iron liquor thickened with gum. With 50, 60, or even 90 meaſures of ſulphate and acetate of iron, one meaſure of the ſtandard blue will give very good ſhades of pale blue. When the pattern, whether block or plate, will not work in gum, a portion of the acetate of iron muſt be thickened with ſtarch, or flour, and ground up in the mill with its due proportion of the ſtandard. When worked on plates, wooden doctors, eſpecially lime tree, are preferred to ſteel ones; they clean the plate much better, and give a fine neat impreſſion.

The vats are of the ſame form, and generally of the ſame dimenſions, as thoſe before deſcribed; they are, however, never lined with lead; wood, or ſtone, being conſidered ſufficiently ſecure for ſolutions of little value, compared with thoſe of indigo. They are diſpoſed in a line, a copperas vat, and a lime vat alternately; or when the mode of dipping allows it, a lime vat between two copperas vats, forming a ſyſtem in which two frames are worked; the lime vat being thus kept conſtantly employed, the copperas vats only alternately. The copperas vats are made up of different ſtrengths, according to the work intended to be done; ſtrong thick goods, ſuch as Marſeilles quilting, &c. require ſtronger vats than calicoes and muſlins. The firſt require the ſolution to be of ſpe. gravity 1040, the latter about 1030. Theſe are the moſt economical points, but good work may be done at any point between 1025 and 1050. Lower than 1025, the colour will be pale and faint, though even; and higher than 1050, it is liable to be uneven, ſome parts being very deep and full, and others mealy and ſpoiled.

The lime vats are ſet with fine ſifted quick lime, recently ſlaked, in the proportion of 150 lbs. to 1000 gallons of water.

When the pieces are hooked, and properly arranged on the frame, they are entered firſt into the lime, and the dipping proceeds as follows.

1.	Entry in the lime vat	5 minutes.
2.	in copperas vat	30
3.	in lime vat	10
4.	in copperas vat	30
5.	in lime vat	20
6.	in copperas vat	45
7.	in lime vat	45

During the firſt five minutes in the lime, the frame muſt be gently rocked, or moved up and down, then drawn up and tightened. The vat, both now, and at every ſubſequent dip, is well raked up before the frame is entered. When entered

in the copperas vat, rock five or six times, to detach the loose lime from the piece.

At the second entry in the lime, rock the whole time.

At the second, and every succeeding entry in the copperas vat, rock five or six times as before, to detach the lime.

At the third and fourth entry in the lime, rock five or six minutes, and now and then.

The reason for finishing out of the lime, is to keep the frames and hooks free from the rust and incrustation of the copperas, which it loosens, and renders more easy to detach and clean; with respect to raising the colour, it makes no difference whatever.

When the piece comes from the copperas vat the second time into the lime, it will appear a grass green colour, if there be a proper quantity of lime in the vat. If too little, the piece will appear yellowish, and more lime must be added.

Take off the pieces quickly after the last dip, and winch them briskly in the water-pit a minute or two at the most. Get them into the sours, and after winching over twice or thrice, let them lie an hour or two, after which winch again four or five times, and wash well in the wheel. Hot water them, and wheel again before hot souring, which is done in a sour of spec. gravity 1015, heated to 180°. Winch the goods four or five minutes in this, after which wash, hot water, &c. and finish for drying.

If the goods are kept too long out of the cold sour after the last dip, the oxyd of iron, with which they are coated, oxygenates very rapidly, and the cloth becomes buff or orange. It is with difficulty that the iron is disengaged, and not without long and very strong hot souring.

The cold sours soon become foul with the loose superfluous indigo, which is detached, and unfits them for light goods, long before the acid is saturated.

In this case it is economical to add two or three shovels full of fine well-beaten clay, previously mixed up with water; when this is well incorporated with the sours, and suffered to subside, it carries down with it great part of the floating indigo, and renders them fit for use again.

After every day's work the lime and copperas vats must be refreshed.

From 25 to 35 lbs. of sifted lime, according to the size of the vat, and the number of pieces that have been passed through it, must be added every night.

No harm can arise from excess of lime, excepting the unnecessary expence of more than is required, and the accumulation of sediment or mud in the vat which will soon require removing.

Ten pounds of copperas are generally added for every piece of calico that is dipped. This is suspended at the surface in a wicker basket, and suffered to remain till all is dissolved. It is quite unnecessary to rake up the vat, as the fresh additions of copperas will incorporate uniformly without stirring, which, by muddying the vat, may do mischief. Care must be taken to use the hydrometer frequently to correct any deficiency or excess which may arise in the sp. gr. of the solution of sulphate of iron.

In making new or fresh copperas vats, after having brought them to the standard on the hydrometer, add to every 1000 gallons four or five gallons of the lime vat (raked up) and one pound of potash. This is to neutralize the superabundant acid of the copperas.

The grass green Yorkshire copperas is the best for this purpose, it contains the least free acid; the pale whitish green is the worst, and when such is used it will be proper occasionally to throw into the vat about one pound of potash, and four or five gallons of muddy lime water.

When daily worked the lime vats should be emptied out, and wholly renewed once a month at least.

The copperas vats are never wholly emptied, but when the mud accumulates so as to be troublesome and endanger the safety of the work by resting on the lower edge of the piece, it must be taken out with a scoop or shovel proper for the purpose.

The ground of those goods which shew much white will in general be sufficiently clear when finished according to the preceding directions, the white is however greatly improved by a gentle soaping, and one or two days exposure on the grass.

In general, better work may be produced in the winter months than in summer: in hot weather, the colour is liable to be uneven, patched and mealy, the cause of this has not been well ascertained, though, in all probability, it arises from the increased action of the sulphate of iron and lime at an increased temperature: it is not unlikely that weaker copperas vats would be found to act better in summer than strong ones, as the effect of temperature would thereby in some degree be counteracted.

From the nature of the process of China blue dipping, it must be evident that it must precede any other application of colours to which the cloth is intended to be subjected. If, for instance, reds or yellows are to be introduced, these must follow the operation of dipping; as they would inevitably be ruined by repeated immersion in copperas and lime, or wholly discharged by cold and hot souring

Dipping, in *Magnetics*, is a certain degree of inclination, which a magnet or magnetic body, be it natural or artificial, endeavours to attain in most parts of the world. Amongst the properties of a magnet, this of its dipping undoubtedly is one of the most admirable; but with a magnet already possessed of its characteristic properties, this dipping is not easily discerned; it being difficult to say, whether the inclination of one of its extremities below the horizontal plane, and of course the elevation of its opposite extremity above that plane, is owing to the magnetic virtue, or to the want of mechanical balance, (*viz.* to its being heavier on one side of the fulciment than on the other,) and it was evidently on this account that the dipping of the magnet was not discovered so soon as its property of directing itself north and south, or nearly so. See Magnetism.

The easiest method of observing this magnetical property is as follows. Suspend an oblong and *unmagnetic* piece of steel either upon a vertical pointed wire, after the manner of a common compass-needle, or by fastening a fine thread to its middle; so that the oblong piece of steel may remain perfectly balanced, and of course horizontal. (A common oblong sewing-needle, having a thread fastened to its middle, will answer sufficiently well.) Then let this piece of steel or needle be rendered magnetic by the mere application of two powerful magnetic bars to its extremities; taking particular care not to disturb its point of suspension; and when this has been done, and the magnets have been removed, the piece of steel or needle will no longer remain in an horizontal situation, but one of its extremities will dip; that is, will incline itself below the horizontal plane, and its opposite extremity will raise itself above that plane, making an angle with it which is different in different parts of the world, and in some places it vanishes; that is, the needle will remain horizontal. This angle is also various in the same fixed place at different times; this latter variation however is but trifling. In England, the north end of the magnet tends downwards. A clearer idea of the different inclinations of the magnet, or magnetized steel, in different parts of the world, as well as of

of the caufe upon which that phenomenon depends, may be derived from the following experiment. Take a globular magnet, N S, *Plate* IV. *Magnetifm fig.* 22, commonly called a *terrella*, or a magnetic fteel bar, N S, *fig.* 23. (for by drawing a circle round the latter, one may eafily figure to himfelf the form of a globular magnet.) The extremity N of this terrella, or fteel bar, is its north pole, and the extremity S its fouth pole; aud A is its middle or equator. P.ace it upon a table as C D; then take another fmall and oblong magnet, or a common fewing-needle rendered magnetic; fufpend it by faftening a fine thread to its middle, in fuch a manner as to remain in an horizontal pofition when not influenced by any other magnet. Now, if the faid fmall magnet, being held by the upper part of the thread, be brought juft over the middle of the large magnet, within two or three inches of it; you will find that it will turn itfelf fo as to direct its fouth pole *s* towards the north pole N of the large magnet, and its north pole *n* towards the fouth pole S of the large one; it being a well-known law in magnetics, that poles of different denominations attract each other. It will be farther obferved, that the fmall magnet, whilft kept juft over the middle A of the large magnet, will remain parallel to it or to its magnetic axis; for in that cafe the poles of the fmall magnet are equally attracted by the contrary poles of the large magnet, which are equidiftant from the former. But if the fmall magnet be moved a little nearer to one end than to the other of the large magnet, then one of the poles of the former, namely, that which is neareft to the contrary pole of the latter, will incline itfelf towards it; and of courfe the other extremity will be elevated above the horizon. This inclination of the fmall magnet will be found to increafe in proportion as it is brought nearer and nearer to one of the poles N or S; and, at laft, if it be brought directly oppofite to one of thofe poles, it will turn its contrary pole towards it, and will place itfelf in the fame ftraight line with the axis of the large magnet, as is indicated by the figures 22 and 23, wherein the like parts are denoted by the fame letters.

It muft now be obferved, that all the facts that have hitherto been noticed relative to the fubject of magnetifm, tend to prove, that the whole earth is, or muft be confidered as a large magnet; having its magnetic poles, magnetic equator, &c.: hence a magnetic needle, or any other magnet whatever, fituated on different parts of the earth's furface, inclines, or tends to incline, the one or the other of its extremities, towards the horizon, or towards the axis of the earth, in the fame manner and for the fame reafons that compelled the fmall magnet *n s* of the preceding experiment to affume its various directions when placed in the vicinity of the large magnet N S. For, admitting that the north pole of the earth is poffeffed of a fouth magnetic polarity, and that the oppofite pole is poffeffed of a north magnetic polarity, it follows, as is confirmed by actual experience, that when a magnet, properly fhaped and properly fufpended, is kept near the equator of the earth, it muft remain in an horizontal fituation; that if it be moved nearer to one of the poles of the earth, it muft incline one of its extremities; namely, that which is poffeffed of the contrary magnetic polarity; that the faid inclination muft increafe in proportion as the magnet, or magnetic needle, recedes from the equator of the earth; and, laftly, that when brought juft over either of the magnetic poles of the earth, it muft ftand perpendicular to the ground; *viz.* in the fame ftraight line with the axis of the earth.

The reader muft not be furprifed to hear that a fouth magnetifm is attributed to the north pole of the earth; it being only meant, that it has a magnetic polarity contrary to that end of the magnetic needle which is directed towards it; and as we call the fame end of the needle a north magnetic pole, we muft of neceffity attribute a contrary power, that is, a fouth magnetic polarity, to the northern part of the earth.—With a proper change of names, the fame remark muft be applied to the fouthern part of the earth; *viz.* it muft be confidered as being poffeffed of a north magnetic polarity.

By a little attentive confideration it will be eafily comprehended, that the true and natural fituation of a magnet, or magnetic needle, is a combination of its horizontal and vertical direction; *viz.* the magnetic needle endeavours to place itfelf in the plane of the magnetic meridian, and in a direction more or lefs inclined to the horizon, according as it happens to be fituated, nearer to or farther from any of the magnetic poles of the earth. And this natural direction of the magnet is called the *magnetical line.* Therefore, in order to obferve the true dipping of the magnet, the magnetic needle, or oblong magnet, muft be placed in the magnetic meridian; *viz.* in the ufual direction of the compafs at the place of obfervation; otherwife the inclination of the magnet will be greater than it ought to be, as may be eafily derived from a due confideration of the combined forces which act upon it. Hitherto we have confidered the earth as an uniform and regular magnet, having the magnetic poles in its real poles, and its magnetic equator in its true or aftronomical equator. And if fuch were the cafe, the dipping angle, which the magnetic needle makes with the horizon, would bear a certain determined ratio to the latitude of the place; fo that by obferving that angle, the latitude of the place might be deduced from it, without the need of any aftronomical obfervation, which would prove of the utmoft advantage to navigators; the cafe, however, is far different, as will be more particularly noticed in the fequel. For the prefent it will be worth while to mention, that after the difcovery of the dipping property of the magnet, fanguine expectations were entertained refpecting the advantages which might be derived from it, and it was imagined, that not only the latitude, but the longitude alfo of the place of obfervation, might be indicated by the dipping angle of the magnetic needle; for though it foon appeared, that neither the magnetic poles, nor the magnetic equator, of the earth, coincided with its true poles and true equator; yet that very fame circumftance feemed to furnifh the method of determining the longitude; which method was grounded upon the following principle; *viz.* that if the magnetic poles, though different from the real poles of the earth, be either fixed in other places, or do move with any regularity, it follows that the magnetic equator muft likewife differ from the real equator; and muft cut it at a certain angle; therefore, in the fame parallel of latitude, but in different longitudes, the dipping angle of the magnet muft be different; hence, by obferving the dipping angle of the magnet at any particular place, the longitude of the place would thereby be indicated. Impreffed with this idea, during a long period, fubfequent to the difcovery of the dipping of the magnet, the fcientific world made various and ftrenuous exertions for the purpofe of rendering that magnetic property fubfervient to navigation. Innumerable calculations were made, and various inftruments were contrived. Mr. Henry Bond, a diftinguifhed teacher of the art of navigation in London, calculated a table of latitudes correfponding to every five minutes of the inclination of the magnetic needle, and it was given out, that with this Mr. Bond's table, a good dipping needle, and the latitude of the place of obfervation, one might determine the longitude of any place in the world. Phil. Trans. v. viii. p. 6065. Mr. Bond was not the only projector of the kind. Meffrs. Ditton, Whifton, and many others followed his example. Some were pofitive, others doubtful, and a few

 cautious

cautious persons patiently awaited the result of experience; but the result of actual experiments soon proved the impracticability, or the insufficiency, of the projects, which were of course gradually neglected, and were lastly even ridiculed by the facetious Dean Swift. The principal object of calculation is to determine the nature of a curve which might pass through the poles of a large magnet, and to which curve a small magnetic needle may be a tangent at any point of its course. Or, in case of the earth, to calculate the inclination which the needle must have in any particular point of its surface. The data, however, upon which these calculations must be grounded, are uncertain. The magnetic needle is acted upon by both poles of the earth, and the law of that action is by no means well known; though it appears, both from experiments and calculation, that, most probably, the force of each pole varies in the inverse duplicate ratio of the distance. See Mr. Lambert's experiments and calculations in the Memoirs of the Academy of Berlin for 1756, and his second dissertation in the 22d volume of the same. We might refer our readers to other works, and we might also insert proper specimens of the calculations that have been proposed and actually made; but since the projects are neither established upon unquestionable principles, nor are they at all satisfactory, we shall not swell this article by the introduction of intricate investigations.

In short, it appears, from the concurrence of all the most accurate experiments and observations that have been made upon land as well as at sea, 1st, that the earth is not an uniform or regular magnet, but a very irregular one; for the ferruginous parts of it, (from the joint action of which the magnetism of the whole arises,) are irregularly disposed through it; whence it arises, that according as the magnetic needle is nearer to or farther from any ferruginous matter, so it is more or less influenced by it. 2dly, the magnetic poles of the earth are neither diametrically opposite to each other, nor indeed have philosophers as yet been able to determine their precise situations. Professor Krufft, in the 17th vol. of the Petersburgh Commentaries, places the north magnetic pole of the earth in lat. 70° North, and longitude 23° West of London; and the south magnetic pole in latitude 50° South, and longitude 92° East. Wilcke of Stockholm, in his indication chart, in the 33d vol. of the Swedish Memoirs, places the north magnetic pole in latitude 75° North, near Baffin's Bay, in the longitude of California, and the south pole in the Pacific Ocean, latitude 70° S. Churchman places the north pole in latitude 59° N. and longitude 135° W. and the south pole in lat. 59° S. long. 165° E. A planisphere by the Academy of Sciences at Paris for 1786, places the magnetic equator so as to intersect the earth's equator in long. 75° and 155° from the Island of Ferro, with an inclination of 12° nearly, making it nearly a great circle. But we are not informed on what authority, nor does this statement agree with the observations of the dipping made by British navigators. Mr. Churchman has given a sketch of a planisphere with lines which may be called parallels of the dip. Those parts of each parallel that have been ascertained by observation, are marked by dots, so that we can judge of his authority for the whole delineation. The magnetic equator cuts the earth's true equator in long. 15°, and 195° E. of Greenwich observatory, at an angle of 17° nearly. The circles of magnetic inclination are not parallel, being considerably nearer to each other on the short meridian than on its opposite. 3dly, the magnetism of the earth, *viz.* the positions of its magnetic poles, magnetic equator, &c. are subject to a gradual, but uncertain variation, which, in all probability, arises from the irregular heating and cooling, from the formation and decomposition of the different internal parts of the earth, and perhaps from other causes.

Notwithstanding the failure of the advantages which were expected from the dipping property of the magnet, it must be acknowledged, that the dipping needle, which shews the above-mentioned property of the magnet, seems, upon consideration, to be the principal instrument, from the indication of which we may expect to complete the magnetic theory of the terraqueous globe: it is therefore to be wished, that accurate, and at the same time least expensive, instruments may be contrived for the purpose; and that numerous as well as accurate observations may be made with them in every part of the world.

DIPPING-*Needle*, is an instrument which shews the inclination of the magnet, or the natural direction of that admirable production of nature, at the place in which the instrument is situated. The observations of the dipping property of a magnet, or magnetized body, require much more accurate instruments, and much greater attention, than those of the horizontal direction of the compass.

Mr. Norman, the first observer of the magnetical dipping, made a considerable number of original observations with instruments not much capable of accuracy; and, indeed, if the various circumstances which are capable of rendering the dipping-needle imperfect be duly considered, the great difficulty of the construction will be easily perceived. The principal parts of a dipping-needle are an oblong piece of steel called the *needle*, so nicely poised upon an horizontal axis, as to remain in any situation in which it may be placed when not magnetized: hence, when it is afterwards rendered magnetic, it may place itself in that direction which the magnetic virtue alone compels it to assume. The instrument must likewise be furnished with a divided circle, concentric with the needle's axis of motion, and situated so as to measure the angle which the needle makes with the horizon. But the difficulty of poising a needle, with such a perfect coincidence of its centre of gravity with its axis of motion, is very great; and even when this object is accomplished, the introduction of dirt or dust, either between the axis and surface upon which it rests, or upon the needle itself, will easily derange the whole. It is likewise difficult to make the observations free from error; for instance, if the needle, moveable only in a vertical plane, be not set in the plane of the magnetic meridian, it will always dip too much. At London, where the magnetic dip makes an angle of about $72\frac{1}{2}$° with the horizon, if the dipping-needle be situated in a plane 20° distant from the magnetic meridian, it will stand nearly perpendicular to the horizon; for in this case the needle, agreeably to the mechanical resolution of forces, will place itself in the situation which brings it nearest to the true magnetic meridian. It is probably owing to this kind of inaccuracy, that the observations of the dip, made by Norman and other contemporary observers, seem to give the dip much greater than they ought to do.

The general mode of constructing the dipping-needle, or the simplest construction of the instrument, consists of an oblong piece of flat steel, called the needle, broader in the middle, and tapering towards the extremities. An axis passes through the middle of it, and its extremities move in two holes, so that the needle can move edgeways, upwards and downwards, like the beam of a pair of scales. Two lateral bars, in which the holes for the extremities of the axis are made, are fastened to a divided circle, which is to indicate the angle which the needle makes with the horizon. The divided circle, with the lateral bars and needle, are fixed

fixed upon a pedeftal, which may be placed duly horizontal by means of fcrews and a level or two.

Fig. 24. (*Plate* IV. *Magnetifm*) reprefents this inftrument in its fimpleft ftate. A B is the needle, the axis of which, E F, refts upon the middle of the two lateral bars C D, C D, which are made faft to the divided circle, E F. G is the ftand which fupports the whole, and which is furnifhed with three fcrews and a fpiral level. With fuch a ftand the inftrument is to be ufed upon land; but at fea the inftrument, without the ftand, is fufpended by a ring H, to a proper frame, fo as to hang perpendicularly in the plane of the magnetic meridian, the fituation of which is fhewn by a common compafs.

The beft method of obferving the dip, is to place the needle in the magnetic meridian by means of a common compafs, taking care to place the two inftruments fufficiently diftant from each other, left they fhould influence each other's movements. Then obferve the angle which the dipping-needle makes with the horizon. Sometimes the frame, which contains the dipping-needle, is furnifhed with two fight vanes on an index, which moves horizontally on the top of the frame, and through thofe fights a diftant object, the bearing of which is exactly known, may be kept in view, in order to fituate the dipping-needle in the magnetic meridian.

With fuch an inftrument the error of obfervation, which may arife from the poffible want of balance in the needle, is ufually removed in the following manner:—After having obferved the dip, with one end of the needle downwards, the magnetifm of it is reverfed by the application of magnetic fteel bars (fee MAGNETISM); fo that the end which had the north polarity may now be poffeffed of the fouth polarity, and *vice verfâ*. Then the dip is obferved again with the other extremity of the needle downwards; and a mean of the two obfervations is taken as the true or correct dip. Befides this, the needle may be turned with each of its two flat furfaces, alternately to the right and to the left, fo as to make, altogether, four obfervations; a mean of which will come much nearer to the truth.

It is almoft ufelefs to remark, that in the conftruction of fuch inftruments, as well as in making the obfervation, no iron, fteel, or other ferruginous matter, muft be fuffered to be in the frame, or about it, fince a very fmall quantity of it is fufficient to render the obfervation erroneous.

A great imperfection in the dipping needle arifes from the different forces with which the magnetifm of the earth acts upon its two extremities, in different degrees of inclination. This fource of error will be illuftrated by *fig.* 25. Let A B be the dipping-needle; the circle E F reprefents one end of its axis; the lower part, F, of which refts upon the fupport C D; and E F is the line which paffes through the centre of the needle, and divides it into two equal parts. It is evident, that before the needle has acquired any magnetifm, if it be of an uniform figure, and its axis be truly cylindrical, the needle muft remain in any fituation in which it happens to be fituated, fince the perpendicular, raifed from the point where the axis E F touches the fulcimen C D, paffes always through the centre of the needle, and divides it into two equal parts; whence the needle becomes perfectly balanced in any degree of inclination. But though the needle be perfectly balanced, yet it is manifeft, that in an inclined fituation, as fhewn in *fig.* 26, the part of it, G A, which ftands above the point of reft G, is longer than the part B G, which ftands below it; and this difference increafes according as the inclination increafes, becaufe the axis of the needle is not a mathematical line, but a body of a certain diameter; fo that, when the needle ftands in a perpendicular fituation, that part of it, which lies above the fupporting plane, exceeds the other part juft by the diameter of the axis. Now when the needle is inclined, as in *fig.* 26, fuppofe that two equal and like forces be applied to its extremities A and B, it is evident, that the force applied to the extremity A, muft have more power to move the needle than that which is applied to B, becaufe G A is the longer lever of the two. This inequality of effects muft evidently increafe according as the inclination increafes, and is greateft when the needle ftands in a perpendicular fituation. The application of thefe forces takes place when the needle has been rendered magnetic; for, as the greateft attractive and repulfive powers, between the magnetic poles of the earth and the poles of the needle, act upon the extremities A and B, the above-mentioned irregularity muft increafe with the inclination of the needle, and with the degree of its magnetic power. No effectual method of removing this caufe of error has, as yet, been devifed.

Having premifed a fufficient idea of the general conftruction, and the common imperfections of this delicate magnetical inftrument, it is now neceffary to defcribe the beft or moft improved inftruments of the kind, and to fubjoin the moft approved precautions, which fhould be obferved in the ufe and management of the fame.

In the year 1772, Mr. Nairne completed two dipping needles for the Board of Longitude, agreeably to a plan of the Rev. Mr. Mitchell, a gentleman eminently diftinguifhed for his great knowledge in magnetics. Not long after, the fame artift conftructed a fimilar inftrument for the Royal Society; which, however, differed in fome particulars from the former. They are all remarkably well made; but we fhall firft defcribe one of the former; for it will afterwards be eafy to point out the few particulars in which the dipping needle of the Royal Society differs from them. *Fig.* 27. is a delineation of one of the needles, made for the Board of Longitude. A A is the needle, whofe length is twelve inches. B, B, are the ends of its axis, which reft upon the four friction wheels, C, C, C, C. The ends of the axis of the needle, as well as thofe of the axes of the friction wheels, are made of gold alloyed with copper, and they all bear againft flat pieces of agate, D, D, D, finely polifhed. The ends of the axes, of the wheels, move in holes made in bell metal. E E E is the circle of bell-metal, which is divided into degrees and half-degrees, for the purpofe of fhewing the angle which the needle makes with the horizon. It is hardly neceffary to obferve, that the centre of the needle coincides with the centre of the divided circle. In reading off the angle, &c. the meafure of it was expreffed in degrees and minutes; but the minutes were reckoned by eftimation; for inftance, the third part, or what appeared to be the third part of half a degree, was reckoned ten minutes; the half was reckoned fifteen minutes, and fo forth. The needle was nearly balanced before it was rendered magnetic; but it may be adjufted after impregnation, by means of a crofs of wires, F, F, F, F, which was the contrivance of the Rev. Mr. Mitchell, and is affixed to the axis of the needle. Each of the wires, which form the arms of this crofs, is cut with a fine fcrew, to receive a fmall weight, or button, which may be fcrewed nearer to, or farther from, the axis of motion; whence the needle may be adjufted both ways with great nicety, by reverfing the poles, and changing its fides. G, G, are two levels, which ferve to fet the line of 0 degrees truly horizontal. H is the perpendicular axis, whereby the inftrument may be turned fo that the divided face of the inftrument may front either the eaft or the weft. I is an index, fixed to the perpendicular axis H, and which points to an

oppofite

opposite line on the horizontal plate K, when the instrument is turned half round. L, L, L, L, are four adjusting screws, to set the instrument properly. One of these screws is hid behind the circle. M, M, M, M, are screws which hold the glass-cover, to prevent the disturbance of the needle by the wind.

The 66th volume of the Philosophical Transactions contains an account of the meteorological instruments used at the Royal Society's house, by the Hon. Henry Cavendish; and in that part of this account, which treats of the construction and management of the dipping needle, Mr. Cavendish expresses himself in the following manner:

"In this instrument, the ends of the axis of the needle roll on horizontal agate planes, a contrivance being applied, by which the needle is at pleasure lifted off from the planes, and let down on them again, in such a manner as to be supported always by the same points of the axis, resting on the same parts of the agate planes; and the motion with which it is let down is very gradual and without shake. The general form of the instrument, the size and shape of the needle, and the cross used for balancing it, are the same as in the dipping-needle described in the Phil. Transf. vol. 62. It is also made by the same artist, Mr. Nairne.

"It may be seen in the Meteorological Journal, that the dip was observed first with the front of the instrument to the west, and then to the east; after which the poles of the needle were reversed, and the dip observed both ways as before. The reason of this is, that the mean of the observed dips, in these four situations, differs very little from the truth, though the needle is not well balanced, and even though a great many other errors are committed in the construction of the instrument; provided the needle is made equally magnetical after the poles are reversed as before; (it is easy to see whether the needle is made equally magnetical after the poles are reversed as before, by counting the number of vibrations which it makes in a minute;) and that the difference of the observed dip, in these four situations, is not very great, as will appear from the following considerations."

"First, let *fig.* 28. be a front view of the needle; AB a line parallel to the direction of magnetism therein; and C D a perpendicular thereto, meeting it in the line joining the centres of the cylindrical ends of the axis, or in the axis of motion, as we may call it. If the needle was truly balanced, its centre of gravity would be in *d*, the intersection of A B and C D. Suppose now, that the needle is not truly balanced, but that its centre of gravity is in *g*; draw *g n* perpendicular to A B, cutting it in *m*; and let the parts *m n* and *m g* be equal. When the instrument is turned half way round, so that the contrary face of the needle is presented towards us, the edge, ADB, which is now lowest, will become uppermost, and the centre of gravity will be in that situation in which the point *n* now is; therefore, the mean between the forces with which the needle is drawn out of its true position in these two situations, in consequence of its not being truly balanced, is accurately the same; and the mean between the two observed dips is very nearly the same, as if the centre of gravity was at *m*. But if the centre of gravity is at *m*, the dip will be very nearly as much too great in the present state of the needle, as it will be too little when the poles are reversed. Therefore, the mean of the observed dips in these four situations will be very nearly the same as if the needle was truly balanced.

"Secondly, if the planes on which the axis rolls are not horizontal, the dip will be very nearly as much greater than it would otherwise be, when one face is turned to the west, as it is less when the other is; for if these planes dip towards the south in one case, they will dip as much towards the north in the other, supposing the levels by which the instrument is set, to remain unaltered. Consequently, the mean of the two observations will be very nearly the same as if they were placed truly horizontal.

"Thirdly, by the same method of reasoning it appears, that the mean of the two abovementioned observations will be not at all altered, though the line, joining the mark on that end of the needle by which we observe, with the axis of motion, is not parallel to the direction of magnetism in the needle; that is, though the mark does not coincide with the point A or B, or though the line joining the two divisions of 90° is not perpendicular to the horizon, or though the axis of motion does not pass through the centre of the divided circle, provided it is in the same horizontal plane with it. If, indeed, the axis of motion is not in the same horizontal plane with the centre of the divided circle, the error proceeding from thence will not be compensated by this method of observing, unless both ends of the needle are made use of. This, however, is of no consequence, as it is easy to examine whether they are in the same horizontal plane or not.

"But the error which is most difficult to be avoided is, that which proceeds from the ends of the axis being not truly cylindrical. I before said, that the parts of them which rest on the agate planes are always exactly the same. The instrument is so contrived, however, that we may on occasion, by giving the axis a little liberty in the notches by which it is lifted up and down, make those planes bear against a part of the axis distant about $\frac{1}{100}$th or $\frac{1}{50}$th of an inch from their usual point of bearing. Now, I find, that when the axis is confined so as to have none of this liberty, and when care is taken, by previously making the needle stand at nearly the right dip, that it shall vibrate in very small arches when let down on the planes; that then, if the needle is lifted up and down any number of times, it will commonly settle exactly at the same point each time, at least the difference is so small as to be scarcely sensible; but if it is not so confined, there will often be a difference of 20′ in the dip, according as different parts of the axis rest on the planes; and that, though care is taken to free the axis and planes from dust as perfectly as possible, which can be owing only to some irregularity in the axis. Moreover, if the needle vibrates in arches of five or more degrees, when let down on the planes, there will frequently be as great an error in the dip. It is true, that the part of the agate planes, which the axis rests on when the vibrations are stopped, will be a little different according to the point which the neeole stood at before it was let down; which will make a small difference in the dip as shewn by the divided circles, when only one end of the needle is observed, though the real dip or inclination of the needle to the horizon is not altered; but this difference is by much too small to be perceived; so that the abovementioned error cannot be owing to this cause. Neither does it seem owing to any irregularity in the surface of the agate planes, for they were ground and polished with great accuracy; but it most likely proceeds from the axis slipping in the large vibrations, so as to make the agate planes bear against a different part of it from what they would otherwise do. I have great reason to think, that this irregularity is not owing either to want of care or skill in execution; but to the unavoidable imperfection of this kind of work. I imagine too, that this instrument is at least as exact, if not more so, than any which has been yet made."

We shall now subjoin a statement of experiments carefully made

made with one of the abovementioned needles, conftructed by Nairne for the Board of Longitude, whence the reader will be enabled to judge of the accuracy which may be expected from thefe obfervations, and of the particulars which muft be attended to in making thofe obfervations.

Firft fet of experiments made by Mr. Nairne. In thefe experiments the needle being placed, as nearly as poffible, in the magnetic meridian, was raifed to an horizontal pofition, and left to vibrate. It was between eight and nine minutes before the vibration ceafed. In fix experiments the dipping needle conftantly fhewed an angle of 72° 20′, with the horizon.

Second fet of experiments, with that fide of the inftrument to the eaft, which was to the weft in the firft obfervations. The needle made an angle of

72° 10′
72 15
72 45 } Here the ends of the axis
72 45 } touched the agates.
72 5
72 0

Third fet of experiments, in which the poles of the needle were reverfed, but the fame fide of the inftrument to the eaft, as in the fecond fet of experiments, and the needle rather more magnetical, being touched with a larger fet of magnets. In fix experiments the dip was conftantly 72° 30′.

Fourth fet of experiments; *viz.* the fame fide of the inftrument to the eaft, as in the firft fet of experiments. The dipping angle made by the needle with the horizon was

72° 10′
72 10
72 15
72 10
72 10
72 10

Fifthly, the fame end of the needle being made north, as in the firft fet of experiments, and alfo the fame fide of the inftrument to the weft, as in the firft fet of experiments, the dipping angle was 72° 20′.

The refults of the above experiments undoubtedly coincide with each other in a remarkable degree; but feveral other experiments of a fimilar nature, made with the fame or with fimilar inftruments, have by no means been attended with the fame remarkable coincidence; and this is particularly to be remarked in the account of Mr. Hutchins's obfervations on the dipping-needle, made at Albany Fort, in 1775, as is ftated in the 66th vol. of the Phil. Tranf. page 179, where the obfervations, made on the very fame day, differ by four degrees and upwards.

Mr. Daniel Bernoulli has fhewn the method of conftructing a pretty fimple dipping-needle, which is capable of confiderable accuracy on fhore. The conftruction is as follows: "Let a dipping-needle be made in the beft manner that can be done by a workman of the place, and balanced with fome accuracy before impregnation, fo that we may be certain that when rendered magnetic it will take nearly the true dip. Touch it (*viz.* magnetize it) and obferve the dip. Deftroy its magnetifm, and then alter its balance in fuch a manner as to render it capable of arranging itfelf in the magnetical line, or in the direction of the obferved dip, though it be not poffeffed of magnetifm. Now touch it again, giving it the fame poles as before. It is plain that it will now approach exceedingly near to the true dip, becaufe its want of perfect equilibrium deranged it but a few degrees from the proper direction. Should this fecond obfervation of the dip differ feveral degrees from the firft, by the inaccurate formation of the needle, it will be proper to repeat the operation, which, however, will feldom be neceffary. Mr. Bernoulli makes this fimple contrivance anfwer the purpofe of an univerfal inftrument in the following ingenious manner. A very light brafs graduated circle E F G, (*Plate* IV. *Magnetifm, fig.* 29.) is fixed to one fide of the needle concentric with its axis, and the whole is balanced as nicely as poffible before impregnation. A very light index C D is then fitted on the axis, fo as to turn rather ftiffly on it. This will deftroy the equilibrium of the needle. If the needle has been made with perfect accuracy, and perfectly balanced, the addition of this index would caufe it always to fettle with the index perpendicular to the horizon, whatever degree of the circle it may chance to point at. But as this is fcarcely to be expected, fet the index at various degrees of the circle, and note what inclination the magnetic needle takes for each place of the index, and record them all in a table. Suppofe, for example, that when the index is at 50°, the needle inclines 46°, from the horizon. If in any place we obferve that the needle (rendered magnetic by lying between two ftrong magnets) having the index at 50, inclines 46°, we may be certain that this is the dip at that place; for the needle is not deranged by the magnetifm from the pofition which gravity alone would give it. As we generally know fomething of the dip that is to be expected in any place, we muft fet the index accordingly. If the needle does not fhew the expected dip, alter the pofition of the index, and again obferve the dip. See whether this fecond pofition of the index and this dip form a pair which is in the table. If they do, we have got the true dip. If not, we muft try another pofition of the index. Noticing whether the agreement of this laft pair be greater or fmaller than that of the former pair, we learn whether we are to change the pofition of the index in the fame direction as before, or in the oppofite.

A needle of this kind in the hands of an experienced philofopher was found to anfwer remarkably well. It is a contrivance worthy of its ingenious author, and deferves to be recommended, becaufe it may be made for a moderate price, and of courfe it may afford the means of multiplying the obfervations of the dip, which are of the utmoft confequence in the theory of magnetifm.

We have now defcribed the beft and moft approved conftructions of an inftrument, to which too much attention cannot be paid either by the artift who conftructs it, or by the obferver who ufes it; and we have pointed out the difficulties which muft be overcome, as well as the precautions which muft be attended to by both. But moft of thefe obfervations relate to the ufe of the dipping-needle upon land. At fea the difficulty of making accurate obfervations with the dipping-needle, is obvioufly much greater, confidering the unfteadinefs of the fituation. The beft contrivance for the purpofe of rendering the dipping-needle more manageable at fea, was made by Dr. J. Lorimer, and the defcription of it, which we fhall now fubjoin, is publifhed in the 65th volume of the Phil. Tranf. In this conftruction the needle fhews, at the fame time and by itfelf, the horizontal and vertical direction of the magnet, or, more properly fpeaking, places itfelf in the magnetical line: whereas the dipping-needles, which we have defcribed in the preceding pages, require to be fituated in the magnetic meridian. In fhort, this needle of Dr. Lorimer anfwers at once the purpofes of a dipping-needle, and of a common compafs. *Fig.* 30. is a reprefentation of this dipping-needle. "Whenever," Dr. Lorimer fays, "any one meets with a terrella, or fpherical load-ftone, the firft thing he does is to find out its poles; and having once difcovered them, he knows immediately how any fmall bits of needle will

will be affected, if it is placed upon any part of the furface of that terrella. The poles are moft readily difcovered by trying where the filings of iron, or a fmall bit of needle, will ftand erect upon the terrella; and this is generally found to be upon two points which are diametrically oppofite to one another. But the magnetic poles of the earth feem to be placed obliquely to one another (fee the Berlin Memoirs, 1757); though where they are actually fituated is hitherto unknown; whether they are upon land or water; or, in either cafe, whether we can come nigh to them. Yet, be thefe things as they may, it appears evident to me, that accurate obfervations, made as near to thofe magnetic poles as poffible, with a good dipping needle, is the fureft way to complete the magnetic theory of this globe, analogous to the method we purfue in examining the terrella. But, as all the dipping needles which I have feen, appeared to me to be very ill calculated for the fea fervice at leaft, I contrived one upon a different plan in 1764, and had it executed before I left England by Mr. Siffon. I have called it an *univerfal magnetic needle*, or *obfervation compafs*, becaufe I can by it take the dip and amplitude, and even the azimuth, with only one affiftant to take the altitude for me. The needle is of the fame fhape and fize nearly as thofe ufed now for the compaffes of the royal navy, and plays vertically upon its own axis, which has two conical points, flightly fupported in two correfponding fockets, which are inferted into the oppofite fides of a fmall upright brafs parallelogram, about one inch and a half broad, and fix inches high. Into this parallelogram is fixed, at right angles, a flender brafs circle, about fix inches diameter, filvered, and graduated to every half degree, upon which the needle fhews the dip, by a vernier, if you choofe; and this, for the fake of diftinction, I fhall call the *circle of magnetic inclination.* This brafs parallelogram, and, confequently, the circle of inclination, alfo turns horizontally upon two other pivots, the one above and the other below, with correfponding fockets in the parallelogram. Thefe pivots are fixed in a vertical brafs circle, of the breadth and thicknefs of two-tenths of an inch, and of fuch a diameter, as to allow the circle of inclination and the parallelogram to move freely round within it. This fecond circle I fhall call the *general meridian.* It is not graduated, but has a fmall brafs weight fixed to the lower part of it, to keep it upright; and the circle itfelf is fcrewed, at right angles, into another circle, of equal internal diameter, of the fame thicknefs, and twice the breadth, which is filvered, and graduated on the upper fide to every half degree. It reprefents the horizon as it fwings freely upon gimbalds, and is always nearly parallel to it. The whole is contained in a neat mahogany box, of an octagon figure, with a glafs plate at top, and one on each fide, for about two thirds down. That part of the frame which contains the glafs lifts off occafionally. The whole box turns round upon a ftrong brafs centre, fixed in a double plate of mahogany, glewed together crofs-wife, to prevent its warping or fplitting; and this again is fupported by three brafs feet, fuch as are ufed for cafes of table knives, frofted, that they may not eafily flip, if the veffel fhould have any confiderable motion. It has another fquare deal box to lock it up in, to preferve the glafs, &c. when it is not wanted for ufe.

"The ufe of this inftrument is very plain, as the inclination, or dip, is at any time apparent from infpection only; and alfo the variation, if the frame is turned round till the great vertical circle lies exactly in the plane of the true meridian: for, the circle of inclination being always in the needle's vertical plane, the edge of it will evidently point out upon the horizon the variation eaft or weft. But at fea, when there is not too much motion, you turn the frame round till the vertical circle is in the plane of the fun's rays; that is, till the fhadow of the one fide of it juft covers the other, and the edge of the circle of inclination will then give the magnetic amplitude, if the fun is rifing or fetting; but the azimuth at all other times of the day; and, the true amplitude or azimuth being found, in the ufual way, the difference is the variation. If the motion is confiderable, obferve the extremes of the vibration, and take the mean for your magnetic amplitude, or azimuth. When the fun does not fhine fo bright as to give a fhadow, you can fet the brafs circle in a line with his body, if he is at all vifible, by your eye. The principal advantage at firft aimed at in this compafs was, to contrive a dipping-needle, which fhould be fufficient for making obfervations at fea; as thofe needles, to be of ufe, muft be placed, by fome means or other, in fuch a manner, as that all their vibrations fhall be made in the true magnetic meridian, north and fouth, otherwife they are good for nothing. For, if one of them is placed, at right angles, acrofs the magnetic line, it will ftand perpendicularly up and down, in any part of the world; the leaft dip, therefore, is always in this magnetic line. But the only method of fetting a dipping-needle at fea, has hitherto been to place it in a line with the common compafs-needle; and this muft be very inaccurate, if they are at any confiderable diftance one from the other; or, if they were near, the two needles would influence one another, and neither of them could be true: nay, fuppofing them for once to be properly placed in this line, the leaft motion of the fhip throws them out again. But this inftrument has a conftant power in itfelf, not only of fetting itfelf in the proper pofition, but alfo of keeping itfelf fo; or of reftoring itfelf to the fame fituation, if at any time it had loft it; and it is curious to fee how, by its double motion, it counteracts, as it were, the rolling motion of the veffel. I have only one thing farther to obferve, that, as it is impoffible for human hands to make any inftrument mathematically true, fo, when we have two graduations to look to, as in the prefent cafe, one on the north, and the other on the fouth end of the needle, we ought to attend to both, and take the medium for the true dip or variation, pretty nearly. But in this compafs, there is another method of examining the obfervations. Take a good artificial magnet, and on the outfide of the compafs-box point one end of it towards the needle, and, by moving your magnet, you may thus guide the north end of the needle round the fouth, or *vice verfâ*, without opening your compafs-box. The magnet being then laid afide, the needle will come to its true pofition, after a few vibrations: but, as both the needle and the circle of inclination are now reverfed, (Dr. Lorimer means that the magnet fhould be applied in fuch manner as to turn the parallelogram and circle of inclination half way round horizontally; fo that, that end of the axis of the needle, which before pointed to the weft, fhall now point to the eaft,) it will not point exactly to the fame divifion as before; yet, a mean of the two will be the truth, as nearly, I believe, as it is poffible for any inftrument to give it.

"Query 1ft. May not a part of this fmall difference be attributed to the direction of the magnetic influence, whatever that be, in the fteel bar? and, if fuch an experiment could be tried upon the prefent azimuth compaffes, is it not probable, that the variation in them would be at leaft as fenfible? Query 2d. May not this be the caufe that two of the beft of them will differ a fmall matter from one another? Query 3d. Would the ends of the needle being made angular, inftead of the fquare form, be, in fome meafure, a remedy for this fmall variation? I am, &c."

N. B. This inftrument requires a moft exquifite workmanfhip;

manſhip ; and the ſockets wherein the pivots move ought to be made of agate.

The only thing which remains to be added for the completion of this article, is a ſtatement of ſome of the beſt obſervations that have been made with the dipping needle ; reſpecting this, however, our ſtatement will be very ſhort, conſidering that little dependence can be placed upon moſt of theſe obſervations, eſpecially thoſe that have been made at ſea. In general it may be obſerved with reſpect to the dipping needle in different parts of the world ; 1ſt. that its inclination does not alter regularly in going from north to ſouth, or *vice verſâ*, along any meridian ; and 2dly, that the variation of the dip at the ſame place, but at different times, is very ſmall.

In London, the dip, as obſerved by Norman, (the inventor of the dipping needle,) in 1576, was 71° 50′. In 1676 it it was 73° 47′ according to Mr. Bond. In 1720 Mr. Whiſton made it 75° 10′. In 1723 Mr. Graham found it to be 73½° or 75°. In 1775 Mr. Cavendiſh made it 72° 30′.

Table *of Dips.*

Latitude North.		Longitude Eaſt.		The north end of the needle below the horizon.		Years in which the Obſervations were made.
°	′	°	′	°	′	
53	55	193	39	69	10	1778
49	36	233	10	72	29	
		Weſt.				
52	24	83	30	79	17	1775
44	5	8	10	71	34	1776
38	53	12	1	70	30	
34	57	14	8	66	12	
29	18	16	7	62	17	
24	24	18	11	59	0	
20	47	19	36	56	15	
15	8	23	38	51	0	
12	1	23	35	48	26	
10	0	22	52	44	12	
5	2	20	10	37	25	
South.						
0	3	27	38	30	3	
4	40	30	34	22	15	
7	3	33	21	17	57	
11	25	34	24	9	15	
		Eaſt.		South and below.		
16	45	208	12	29	28	
19	28	204	11	41	0	
21	8	185	0	39	1	1777
35	55	18	20	45	37	1774
41	5	174	13	63	49	1777
45	47	166	18	70	5	1773

A great many other obſervations made with the dipping needle may be found in the accounts of voyages, tranſactions of learned ſocieties, &c.

DIPPO, in *Ancient Geography*, a town of Spain, marked in Antonine's Itinerary, between Cordoua and Merida.

DIPPOLDISWALDA, in *Geography*, a ſmall town of Saxony, in the circle of Miſnia, ſituated 10 miles ſouth of Dreſden, towards Bohemia, with a population of 1200 individuals, whoſe principal trade conſiſts in hewing excellent mill and whet-ſtones, out of the neighbouring quarries. Their cutlery and potters' ware is alſo much praiſed.

Near Dippoldiſwalda is the tomb of a Tartar, called Muſtapha Sulkiwicz, who, in the ſeven years war, fell as the firſt lieutenant in a Saxon regiment of Coſſacks. It was erected in the year 1762, but time had conſiderably injured it, when the Pruſſians, againſt whom he had fought, but who honoured his valour, reſtored it in 1778.

DIPSACEÆ, in *Botany*, the 56th natural order in Juſſieu's ſyſtem, or the firſt of his eleventh claſs. The definition of this claſs is, *cotyledons*. 2 *Flowers* monopetalous, ſuperior. *Anthers* diſtinct. Proper *calyx*, or *perianth* ſuperior, of one leaf. *Corolla* of one petal, very rarely of many petals cohering by a broad baſe, ſuperior, or placed upon the piſtil, often regular. *Stamens* of a definite number, their filaments inſerted into the corolla, their anthers ſeparate. *Germen* ſimple, inferior ; ſtyle often ſingle, ſometimes manifold, or elſe wanting ; ſtigma ſimple or divided. *Seed* inferior, or rather, for the moſt part, the fruit is capſular or pulpy, of one or many cells, and containing one or many ſeeds.

The characters of the order of *Dipſaceæ* are, *Calyx* ſimple or double. *Corolla* tubular, with a divided limb. *Stamens* of a definite number. *Style* one ; ſtigma ſimple. *Capſule* for the moſt part containing a ſingle ſeed, and not burſting, having the aſpect of a naked ſeed ; very rarely it has two or three cells, with a ſeed in each. *Embryo* without a ſeparate albumen, its radicle ſuperior. *Stem* in general herbaceous. *Leaves* oppoſite, rarely whorled. *Flowers* in a few inſtances diſtinct, in general aggregate upon a common chaffy receptacle, within a common calyx of many leaves. The firſt ſection compoſed of aggregate flowers, contains *Morina*, *Dipſacus*, *Scabioſa*, *Knautia*, and *Allionia* ; the ſecond ſection, deſtined for diſtinct flowers, only *Valeriana*. Juſſieu, in a learned paper, on the New Holland genus, *Opercularia*, in the 4th vol. of the Annales du Muſeum, 418, conſiders it as forming a new natural order between the *Dipſaceæ* and *Rubiaceæ*, to which the *Valeriana*, and Adanſon's *Fedia*, (*Valeriana Locuſta*, &c. of Linn.) ſhould be removed. Ventenat remarks, Tabl. du regne végétal, v. 2, 556, that Adanſon was the firſt botaniſt who detected the eſſential diſtinctions of the order *Dipſaceæ*. We are at a loſs to account for Juſſieu's referring the *Morina* to the ſection of aggregate flowers, with which it accords in no other reſpect than having a double calyx. See Flora Græca Sibthorpiana, t. 28. The infloreſcence is truly whorled, and each flower has its ſeparate ſtalk.

DIPSACUS, ſo called by Pliny after Theophraſtus, from διψαω, to be thirſty, (alluding to the baſins formed by its leaves for holding water, in which birds and other ſmall animals may ſlake their thirſt,) Teaſel, or Venus's Baſin. Linn. Gen. 48. Schreb. 64. Willd. Sp. Pl. v. 1. 543. Juſſ. 194. Gærtn. t. 86. Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Aggregatæ*, Linn. *Dipſaceæ*, Juſſ.

Gen. Ch. *Cal.* Common Perianth of many leaves, containing many flowers ; its leaflets longer than the flowers, lax, permanent ; Proper Perianth ſmall, ſuperior, of one leaf. *Cor.* the univerſal one regular ; proper one monopetalous, tubular ; its limb four-cleft, erect, the outer ſegment largeſt and ſharpeſt. *Stam.* Filaments four, capillary, longer than the corolla, and inſerted into its tube ; anthers incumbent. *Piſt.* Germen inferior ; ſtyle thread-ſhaped, the length of the corolla ; ſtigma ſimple. *Peric.* none. *Seeds* ſolitary, columnar, crowned with the partial calyx. *Common receptacle* conical, beſet with long chaffy ſcales between the flowers.

Eſſ. Ch. Common calyx of many leaves ; perianth ſuperior,

rior, of one leaf. Receptacle chaffy. Seed-crown cup-shaped.

D. *fullonum*, the Manured Teafel, is the moft important fpecies, on account of its ufe in dreffing woollen cloth. Hence it is called *Carduus fullonum*, or Fuller's Thiftle. See Lobel's Icones v. 2. 17, and Gerarde's Herbal 1167. (Dipfacus fativus.) The leaves are united at the bafe, and ferrated. Scales of the receptacle reflexed or hooked, whence its ufe in preference to *D. fylveftris*, *Engl. Bot. t.* 1032, whofe fcales are ftraight and much fofter. This laft grows wild in many parts of England, the former is fcarcely found but in a cultivated ftate. For its culture and ufe, fee Teasel.

Dipsacus, in *Medicine*, according to fome, is the fame with a diabetes.

DIPSAS, in *Zoology*, a fort of ferpent, the biting of which has been faid to produce fuch a thirft as proves mortal; whence it is called *dipfas*, which in Greek fignifies *thirfty*. In Latin it is called *fitula*, a pail. Mofes fpeaks of it in Deut. viii. 15.

The Hebrew word *tzimaon* anfwers very well to the Greek dipfas, and expreffes the thirft occafioned by the biting of this ferpent. Some by the Hebrew *tzimaon* underftand a defart or dry place. The dipfas in the Linnæan Syftem is a fpecies of *Coluber*; the green coluber, with ten white lines of Boddaert, and the cærulean Surinam ferpent of Seba. See Coluber.

DIPTERA, in *Entomology*, the fixth order in the Linnæan Syftem. The infects of this order are known by having two wings, with a clavated poifer under each, as in the common houfe fly (mufca domeftica) which is of this kind. See article Entomology.

DIPTERE, or Dipteron, in the *Ancient Architecture*, a temple furrounded with a double row of columns, which form a fort of porticos, called wings, or ifles.

The word is Greek, formed from δις, *twice*; and πτερον, *ala*, *wing*.

DIPTERYX, in *Botany*, (from δις, double, and πτερον, a wing, becaufe the two upper fegments of the calyx refemble a pair of wings,) Schreb. 485. Willd. Sp. Pl. v. 3. 910. Mart. Mill. Dict. v. 2. (Coumarouna; Aubl. Guian. t. 296. Juff. 364. Baryofma; Gærtn. t. 93.) See Coumarouna. To this is juftly added, by Schreber, Taralea of Aublet, t. 298, under the following characters. Clafs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminofæ*, Juff.

Gen. Ch. *Cal.* Perianth top-fhaped, of one leaf; its two upper fegments oblong, concave, fpreading like wings; the lower one fmall, entire or three-toothed. *Cor.* Papilionaceous. Standard longeft, obovate, erect, with inflexed fides. Wings two, oblong, fhorter. Keel ftill fhorter, of two petals. *Stam.* Filaments eight or ten, united into a tube cloven at the upper fide; anthers fmall, roundifh. *Pift.* Germen ftalked, oblong; ftyle awl-fhaped, afcending; ftigma acute. *Peric.* Legume large, ovate, compreffed, thick, of one cell. *Seed* one, ovate.

Obf. Coumarouna of Aublet has eight ftamens, and the lower lip of the calyx undivided; Taralea ten ftamens, and the lower lip of the calyx three-toothed. The two plants are fo much alike in habit and fructification, that it is truly wonderful any botanift could feparate them, and yet by fome ftrange accident they have fallen afunder even into two different fections of Juffieu's *Leguminofæ*, p. 450 and 364.

Eff. Ch. Calyx with its two upper fegments dilated, fpreading like wings. Stamens all connected. Legume coriaceous, of two valves and one cell. Seed folitary.

1. D. *odorata*. Willd. Sp. Pl. v 3 910. "Leaves alternate. Clufter terminal." Of this an account has already been given under the article Coumarouna. The feeds are now frequently fold in the tobacconifts' fhops of London, by the name of Tongo Beans, and are ufed to give a flavour to fnuff. Their fcent is like that of new hay, or the dried herb Woodruff, *Afperula odorata*. Gærtner having only feen a half-ripe fruit, in which ftate it appears ufually to be gathered for a perfume, miftook it for a *drupa*, but Aublet, who faw it growing, exprefsly defcribes it as a legume of two valves.

2. D. *oppofitifolia*. Willd. Sp. Pl. v. 3. 910. Mart. Mill. Dict. v. 2. (Taralea oppofitifolia; Aubl. Guian. v. 2. 745. t. 298.) "Leaves oppofite. Flowers panicled." A native of the vaft forefts of Guiana, about large rivers, flowering in October, and ripening fruit in March. This is a tree 60 feet high, and 2½ in diameter. The outer bark fcales off in large membranous flakes. The wood is white, hard, compact, and heavy. *Branches* long and widely fpreading. *Leaves* oppofite, croffing each other in pairs, pinnate, of four or five pairs of fmooth, oval, pointed, large leaflets. *Panicles* terminal, large, fubdivided in an oppofite manner. *Flowers* violet-coloured, exhaling a pleafant fcent, which is perceptible at a confiderable diftance.

DIPTOTES, from δις, and πτωτος, of πιπτω, *cado*, in *Grammar*, a kind of irregular nouns, having only two cafes; as *fors*, *forte*.

DIPTYCHA, in *Antiquity*, a public regifter, wherein were written the names of the confuls, and other magiftrates, among the heathens; and of bifhops, and defunct as well as furviving brethren, among the Chriftians.

The word diptycha is formed from the Greek διπτυχον, of διπτυχα, and that from διπτυξ, a mafculine noun, derived from πτυσσω, *I fold*, or *plait*. From its future πτυξω, is formed πτυξ, a *fold*, or *plait*, to which adding δις, *twice*, we have διπτυξ, in the genitive διπτυχος, whence the nominative neuter, διπτυχον, q. d. *a book folded in two leaves*; though there were fome in three, and others in four or five leaves. An ingenious author imagines this name to have been firft given them to diftinguifh them from the books that were rolled, called volumina. See Volume and Book.

It is certain there were profane diptycha in the Greek empire, as well as facred ones in the Greek church. The former were the matricula, or regifter, wherein the names of the magiftrates were entered; in which fenfe diptycha is a term in the Greek chancery.

Diptycha, *facred*. The word is plural; diptycha being a double catalogue, in one whereof were written the names of the living, and in the other thofe of the dead, which were to be rehearfed during the office. We meet with fomething not unlike the facred diptychs of the Greeks, in the canon of the mafs, according to the Latin ufage; where the people are enjoined to pray once for the living, and once for the dead; feveral faints are invoked in different times, &c.

In thefe diptycha were entered the names of bifhops, who had governed their flocks aright; and thefe were never expunged out of the fame, unlefs they were convicted of herefy, or fome other grofs crime. In the diptycha were likewife entered the names of fuch as had done any fignal fervice to the church, whether they were living or dead, and mention was made of them in the celebration of the liturgy.

There were two forts of thefe diptycha; the firft contained the names of the patriarchs, popes, and bifhops, who prefided over the largeft churches, and were ftill alive: in the other were written the names of thofe who died in the peace and communion of the church. The deacon ufed to

read thofe names at the altar during divine fervice. As the admiffion of any bifhop's name into thefe public tables was a token and pledge of communion, fo the erafure of any one's name out of them was a denial of communion with him, and a kind of excommunication. The ufe of thefe diptychs is very ancient, and can be traced up to the fourth century at leaft, if not higher. They contained, fometimes, befides the names of bifhops, thofe alfo of other men, famous for their holinefs and piety, and efpecially thofe of the orthodox emperors, nay, even of general councils; as appears by the emperor Juftinian's letter to Epiphanius, patriarch of Conftantinople. Thefe diptychs are often mentioned by the fathers, councils, and ecclefiaftical hiftorians.

Cafaubon, in his obfervations on Athenæus, lib. vi. cap. 14, fuppofes the Chriftians to have borrowed the cuftom of writing names in a book, and rehearfing them at mafs, from the heathens, who entered the names of perfons they would do any fignal honour to, in the verfes of the Salii; as was done Germanicus and Verus, fons of the emperor Marcus Aurelius, and a long time before, during the age of the republic, to Mamurcus Veturius, and Lucia Volumnia, as we are told by Tacitus, lib. ii. Spartian, Ovid, Feftus, Plutarch, &c. But Fa. Rofweyd does not approve this notion of Cafaubon. The pretended St. Dionyfius, a very ancient author, fays the contrary, and afferts the firft eftablifhment of this ufage to have been founded on fcripture, 2 Tim. ii. 19. Pfalm cxvi. 15. Rofweyd adds Ecclefiaftic. xliv. 1. and takes thefe to have been the paffages the ancient church had a view to, rather than the Salian verfes.

The profane diptycha were frequently fent as prefents to princes, &c. on which occafion they were finely gilt, and embellifhed; as appears from Symmachus, lib. ii. ep. 81. Thofe prefented were ufually of ivory. The firft law, De Expenf. Ludor. C. Theod. forbids all magiftrates below confuls to make prefents of diptycha of ivory in the public ceremonies.

DIPUS, in *Zoology*, a genus of quadrupeds, much refembling the dormoufe: their hind feet are long, and enable them to make prodigious bounds, and with their fore paws they carry food to their mouths like the fquirrel. They are generically diftinguifhed by having two fore teeth in each jaw: the fore legs very fhort, the pofterior ones long, and the tail long and tufted at the tip.

Species.

Sagitta. Hind feet three-toed: no thumb claw. Schreber. *Mus Sagitta: cauda longiffima apice fubpennata nigro-alba, pedibus pofticis longiffimis tridactylis*, Pallas.

There appears to be two varieties of this animal; or at leaft two fpecies fo clofely allied, as to leave us in confiderable doubt whether they ought to be confidered as varieties, or fpecies. The firft, called by Schreber *fagitta*, as above-mentioned, has three toes on the pofterior feet, and no thumb claw. The head of this is rounded, the ears longer than the head, the toes hairy, and the tail terminating in a tuft. The other, *Ægyptius*, has alfo the pofterior feet three-toed, but has a claw on the fore thumb: the body of this kind is thin, and flattened at the fides; the hair on the head and upper parts of the body long, and foft, and of a tawny colour; the breaft and belly whitifh, with a dufky band acrofs the upper parts of the thighs. Both inhabit the eaft, and have the fame manners, living in fandy plains; but the firft is faid to extend towards Siberia, the other to be confined to Egypt and Barbary.

The fpecies *fagitta* is fuppofed to be the μυς διπυς, or *two-footed moufe*, of the ancients, an animal reprefented on the coins of Cyrene, where it was anciently found in great abundance; and which place it ftill inhabits. In the Journal de Phyfique for November 1789, Sonnini laid before the public an interefting account of this jerboa, which animal he had full opportunity of examining during his travels in that part of the globe. "It is in the burning climate of Africa principally (fays this writer) that nature feems to have taken pleafure in varying, in a manner altogether fingular, the forms of the beings which fhe has placed there, and in deviating from the rules and the proportions which fhe feemed to have adopted, if, however, that can be called a deviation which is a proof of her boundlefs and inexhauftible fecundity. On that fiery foil it is we find the giraffe, or camelopard, remarkable for the difproportionate height of his fore legs. We likewife find an extreme difproportion between the legs of the jerboa; but the hinder legs are, in this animal, exceffively long, while the fore legs fcarcely appear. Thefe long limbs, or to exprefs myfelf with greater precifion, thefe long feet, for it is the tarfus which is fo immoderately lengthened, are of ufe to the jerboa only in his progreffive movement: thofe before, which may be confidered as little hands, are ufelefs to him in removing from place to place. He hops after the manner of birds, and this kind of motion, which would be very conftrained to any other quadruped, is fo much adapted to him, that his running, or rather his leaping, is very nimble, and very fpeedy."

"The fize of the jerboa is nearly that of a large rat; the head is broad, large in proportion to the body, flattened above, and of a clear pale red, with a blackifh fhade; the upper jaw projecting beyond the lower, and both furnifhed with two incifive teeth; thofe above are broad, cut in right angles, flat, and divided lengthwife, by a groove paffing through the middle; thofe of the under jaw are longer, convex externally, pointed at their extremity, and bent back inwardly. It is evident that thefe teeth are difpofed nearly as thofe in the hare, the rabbit, and field moufe, and this refemblance has procured all thefe names to the jerboa. It would have been juft as reafonable to take him for a beaver or porcupine. The fnout is fhort, broad, and obtufe; a number of ftiff hairs extend from fide to fide, and form long whifkers. The nofe is naked, wide, and cartilaginous; the eyes large, and prominent, with brown irides; the ears long, large, and covered with fhort hair; externally thefe are white in the lower part, and grey upwards; the middle, as well as the fides of the head, is of a very light fawn colour, mixed with grey and black; they entirely furround the meatus auditorius for about a third of their length, fo that they exactly refemble the larger end of a cone, a conformation that muft increafe the animal's faculty of hearing, and which is particularly well calculated to defend the inner part of the organ from the extraneous fubftances that might otherwife find admiffion.

"The body is broader behind than before, and well covered with long, foft, and filky hair; that on the back and fides afh-colour, almoft the whole length through, and of a clear fawn-colour, where it approaches the points, which are black; but as the afhy part is not apparent, it may be faid the fur is fawn-coloured, with blackifh zig-zag ftripes. Thefe tints, which are fomewhat dufky, form an agreeable contraft with the fine white of the belly. The fore legs are fo fhort, that they fcarcely extend beyond the hair; they are white, and have five toes, the greateft of which, or interior toe, is very fhort, rounded at the extremity, and has no nail; the other four, the fecond whereof, outwardly, is the longeft, are of confiderable length, and armed with great hooked-nails. The heel is very much raifed, and the infide, or fole of the feet, is flefh-coloured. The hind legs are covered with long hair, of a fawn colour, and white; its long

long feet are almoft entirely bare, efpecially on the outfide, which muft neceffarily be the cafe, fince the animal, whether in motion or at reft, conftantly leans on that part. Thefe feet, fo exceedingly long, have each three toes, the middle one of which is rather longer than the other two; they are all provided with nails, which are fhort, but broad and obtufe, and they have alfo a kind of fpur, or rather a very fmall rudiment of a fourth toe, which conftitutes a point of refemblance between the jerboa of Egypt, and the alagtaga of Tartary." According to Haffelquitz, the tail of the jerboa is three times the length of the body; but Sonnini obferves, that he never faw the tail above half this length. Its circumference is not much exceeding that of a large goofe-quill, and is of a quadrangular form; its colour grey, deepeft above, and covered with fleek hair down to the extremity, which terminates in a tuft of long filky hair, half black and half grey.

On comparing this defcription with that which Gmelin has given of the alagtaga, in the new commentaries of the academy of Peterfburgh, fays Sonnini, it will appear that the jerboa has a ftrong refemblance to it: they have both the fame number of toes on the fore-feet, the fpur on the hinder, and the fame length of tail, which is a proof of two things; firft, that the jerboa and the alagtaga are one and the fame animal; and, fecondly, that the defcriptions which have been given of the jerboa are not very accurate. What chiefly fuggefted doubts to Buffon's mind refpecting the identity of the jerboa and alagtaga, was the difparity of the climates which each inhabited, the former being refident in Africa, and the alagtaga being found in the cold regions of Siberia. But this is not the only inftance which might be adduced to the fame effect. Many fpecies of animals are equally fcattered over the icy countries of the north, and over the fultry diftricts of the fouth. Rats take pleafure to refide in very hot climates, and they live very comfortably in the north of Sweden. Hares inhabit with equal convenience, the fnows of Lapland, of Siberia, and Greenland. It is certain that the gerboife of Cyrenaïs, or the deferts of Barca, defcribed by Mr. Bruce, in his Travels in Nubia and Abyffinia, is only a variety in the tribe of the jerboa. The flight differences remarked not being, by far, fufficient to conftitute two diftinct fpecies. To the refearches of Mr. Bruce we are further indebted for the exact knowledge of another animal, which had, very improperly, been confounded with the jerboa, and to which he has given the name of *daman-ifraël,* or lamb of Ifraël. So far from having the diftinctive character of the jerboa, this daman has all his legs equal, or nearly fo, and he has no tail; whereas, that of the jerboa is very long. Dr. Shaw, the traveller through Barbary, was the firft who fell into the miftake of confounding two animals fo very unlike; and this error was fucceffively copied till Mr. Bruce detected it, whofe obfervations have thrown much light on a fubject formerly involved in doubt and darknefs. By taking the jerboa for the daman-ifraël, the fame which the Hebrews call fchafan, all that Arabian authors have faid of the fecond has been afcribed to the firft.

The jerboa meafures from the tip of the nofe to the origin of the tail five inches and a half, the tail itfelf eight inches and a half, and the total length of the pofterior legs about fix inches. There is fcarcely any difference in the fize of the two fexes. The females have eight nipples, the pofition of which is remarkable; they are fituated more externally than in other quadrupeds; the firft pair is beyond the bend of the fhoulders, and the laft is rather under the thigh than the belly; the two other pairs, being on the fame line, are confequently placed rather under the flank, than under the body.

The jerboa is commonly found in Lower Egypt, principally in the Bahiré, or weftern part. The denomination of rats or mice of the mountain has been improperly applied to them, for all the lower part of Egypt is a plain. The fands and rubbifh which furround modern Alexandria are very much frequented by the jerboa. They live there in troops, and with their nails and teeth dig a habitation for themfelves in the ground, and can even penetrate through the foftifh ftone which is under the layer of fand. Without being actually wild, they are exceedingly reftlefs; the flighteft noife, or any new object whatever, makes them retire to their holes with the utmoft precipitation. It is impoffible to kill them, except by furprize. The Arabs contrive to take them alive, by ftopping up all the avenues to their burrows except one, by which they force them to come out. Their flefh is not efteemed a delicacy, though it is eaten; their fkin, which is foft and fhining, is ufed as a common fur.

M. Sonnini fed for fome time, while in Egypt, fix of thefe animals in a large cage of iron wire. The firft night they had entirely gnawed afunder the upright and crofs fticks of their prifon, and he was under the neceffity of having the infide of the cage lined with tin. They lived on wheat, rice, nuts, and every fpecies of fruit. They were very fond of bafking in the fun, and the moment they were put into the fhade they clung clofe to each other, and feemed to fuffer from the privation of warmth. It has been affirmed that the jerboa fleeps by day, and never in the night time; M. Sonnini obferved precifely the contrary. In a ftate of liberty they are met with in broad day light gathering round their fubterraneous habitations, and thofe which he fed himfelf were never more lively, nor more awake, than when expofed to the full blaze of the fun. Though they have much agility in their movements, gentlenefs and tranquillity feem to form their character. They fuffered themfelves to be ftroked with great compofure; and there was among them neither noife nor quarrel, even when food was fcattered among them. They teftified no fymptoms of joy, or fear, or gratitude; their gentlenefs was by no means amiable, or interefting; it appeared to be the effect of a cold and complete indifference approaching to ftupidity.

According to the remarks of M. Berthout-van-Berchem, (fecretary to the Society of Phyfics,) publifhed in 1788, the jerboa and alagtaga are two diftinct fpecies. The jerboa, he obferves, of which Mr. Pennant fpeaks, under the name of alagtaga, and which ought to have been written alakdaaga, has five toes on the hinder feet; the fecond has only three, and differs from it likewife in feveral other characters. "In order to diftinguifh," fays he, "this firft fpecies, which M. Pallas denominates *mus jaculus,* I fhall call it *jalma,* from the name given to it by the Calmucks, and fhall preferve to the fecond fpecies the name of jerbo or jerboa. M. Pallas has obferved three varieties in the jalma, which appear to differ principally in the fize. The moft common, which is of the middle fize between the other two, is the jalma or alak-daaga. It is often found in eaftern Tartary, in the deferts of Siberia, and in the regions beyond the Baïkal. It is likewife found in Syria, nay even fo far as India. Mr. Pennant fays, it is met with in Barbary: but there is no authentic evidence that the jalma is an inhabitant of Africa. He even remarks that it prefers colder countries than what fuit the jerboa, an inhabitant of warm climates. The fecond variety is the largeft of either; it is more rare than the firft; they give it the name of marine jalma,

jalma, and it is to be found in the graffy hills of the Tanaïs, of the Volga, of the Rhymnus, and the Irtis. It is to this variety that we are to refer the animal which Dr. Shaw has erroneoufly defcribed under the name of *daman ifraël*, and which is the fize of the rabbit. The third variety is found, with the large one, towards falt meridional marfhes of the Cafpian fea, and with the middle fized one, in the vicinity of the Volga, and of the Rhymnus. They give it the name of choin jalma; it is the fmalleft of the three. The largeft, or marine jalma, is the fize of a fquirrel; the middle-fized, or jalma, is about as big as a rat, and the fmalleft fcarcely fo large as a field-moufe. All thefe families have five toes on the hinder foot; and in the great number which M. Pallas examined, he never faw a fingle variation as to the number of toes. But what has led Buffon and Sonnini into an error, is the faulty defcription given by Gmelin, who never faw but a fingle fpecimen, probably disfigured, and which prefented to him only three toes, and a fpur, or four toes. He is likewife miftaken with refpect to the manners of this animal, in afcribing to it thofe of the *lepus ogotona*; an error which has been fince copied by the younger Gmelin. Meffer-Chmidt, who had left a good defcription of this animal, does not pretend to fay that it had only four toes. It muft be admitted then, that this fpecies is entirely diftinct from the other, which has three toes on the hinder foot."

The Egyptian jerboa appears to be well diftinguifhed from the Siberian kind, by having only three toes on the pofterior feet inftead of five. Both fpecies are fubject to varieties, both in fize and colour, and alfo in their general habits of life.

Jaculus. Tail, very long, with fubpennated black and white tip: pofterior legs large and five clawed. Pallas. *Alagtaga*, Schreber. *Siberian Jerboa*, Penn.

This agrees in appearance with the Egyptian Jerboa, but grows to a larger fize: it is diftinguifhed principally by the remarkable character of the hind feet, each of which has a pair of very confpicuous fpurs, or additional toes fituated at fome diftance above the front toes, and which are furnifhed with fharp claws.

The colour of the Siberian jerboa or alagtaga is nearly the fame as that of the Egyptian, but has no appearance of a dufky band acrofs the lower part of the back, or any tranfverfe undulations, the whole upper parts being of a pale yellowifh fawn colour, and the under parts white. The length of the body is about eight inches, and of the tail ten. According to Dr. Pallas it is found from the Cafpian fea to the Irtifh, but is no where very frequent. It inhabits dry and fandy foils. There are apparently two varieties of this fpecies differing a little in fize and colour, but not fufficiently to conftitute two fpecies. The firft is the middle Siberian jerboa which is the fize of a rat, and has the thigh croffed by a white line, and a whitifh zone or circle furrounding the nofe; the other is the pigmy Siberian jerboa which refembles the former but has no white circle round the nofe, and has a fmaller tuft to the tail, and is tipped with white; its fize is much inferior. Both inhabit the fame countries, and agree in their habits of life, burrowing in hard clayey ground, not only in high and dry fpots, but even in low and falt places. They dig holes with their fore feet and teeth forming oblique and winding burrows of fome yards in length, and ending in a large hole or neft, in which a ftore of provifion, confifting of herbs, is preferved. They are faid to wander about chiefly by night, and to fleep rolled up with the head between the thighs: they are extremely nimble, and on the approach of danger fpring forward fo fwiftly that a man well mounted can fcarcely overtake them. Thefe animals are faid to be particularly fond of the roots of tulips and other bulbous plants, and that during the winter, they fleep in the manner of dormice.

Mr. Bruce is believed to allude to this fpecies, when fpeaking of the Arabs of the kingdom of Tripoli making good diverfion with the jerboa, in training their grey-hounds which they employ in hunting the gazel or antelope. The prince of Tunis, fon of Sidi Youngis, and grandfon of Ali Bey, who had been ftrangled by the Algerines, when that capital was taken, being then an exile at Algiers, made a prefent to Mr. Bruce of a fmall grey-hound, which often gave him excellent fport. "It may perhaps be imagined (fays Mr. Bruce) that a chafe between thefe two creatures could not be long: yet I have often feen, in a large inclofure or court-yard, the grey-hound employ a quarter of an hour before he could mafter his nimble adverfary: the fmall fize of the creature affifted him much; and had not the grey-hound been a practifed one, and made ufe of his feet as well as teeth, he might have killed two antelopes in the time he could have killed one jerboa."

Cafer. Ferruginous above, beneath pale-afh: anterior feet five-toed, pofterior four: tail villofe with black tip. *Palmis pentadactylis, plantis tetradactylis*, Schreber. *Jerboa capenfis*, Forfter. *Cape Jerboa*, Pennant.

The largeft of the genus, and inhabits the mountainous country to the north of the Cape of Good Hope. Its length from the nofe to the tip of the tail near fifteen inches. The head is broad; the muzzle fomewhat fharp; and the upper jaw longer than the lower. The general colour of the animal is pale ferruginous above and pale afh-colour beneath. The nofe is black, and bare to fome little diftance up the front; the ears large; whifkers long and black; the tail is of the fame colour with the body for half its length; the remainder blackifh, and extremely hairy. It is an animal of great ftrength and activity, and will fpring to the diftance of twenty or thirty feet at once. It burrows in the ground like the fmaller kinds of jerboas with great care and expedition by means of its fore feet which are armed with ftrong claws. It feeds like the fquirrel feated on its haunches, and alfo fleeps in that pofture; it makes a grunting noife; and is eaten by the natives. This animal is figured in the fixth fupplemental volume of Buffon's work. At the Cape it is known among the Dutch colonifts by the name of *Springen Haas*, Jumping Hare.

Meridianus. Yellowifh, beneath white: fore feet three-toed with the rudiment of another: pofterior feet five-toed: tail colour of the body. *Dipus meridianus*, Schreber. *Mus meridianus*, Pallas. *Jaculus palmis tetradactylis, plantis pentadactylis*, Erxleben. *Torrid Jerboa.*

According to profeffor Pallas, this fpecies was firft figured by Seba, whofe fpecimen had not attained to full maturity. In 1770, Pallas received fpecimens that were taken on the borders of the fandy defert of Naryn, between 46 and 47 degrees north latitude. The burrows which thefe animals formed in the dry foil had a triple entrance, and were about an ell deep in the ground. The fize of the animal is between that of the common rat and field moufe; and notwithftanding the great length of the hind legs, it does not leap like the reft of the jerboas, but runs in the manner of the rat tribe; and on this account Mr. Pennant places it in his divifion of jerboid rats. The length, from the nofe to the origin of the tail, is rather more than four inches, and the tail itfelf exceeds three. The nofe is blunt, the mouth placed far beneath; the upper lip bifid; the ears large and rounded; the fore legs fhort, with four toes, and a tubercle in place of a thumb; the hind legs long and flender; the exterior one

fhorter

ſhorter than the reſt. The colour of the animal is brown above, and white beneath; the colours ſeparated along the ſides by a yellowiſh line.

Tamaricinus. Fore feet three-toed; hind feet five-toed; tail tapering, and obſcurely annulated with brown, Schreber. Saeugth. *Mus tamaricinus*, Pallas. *Tamariſk rat*, Penn.

The length of this elegant animal is about ſix inches, meaſuring from the noſe to the tail, and the tail is nearly the ſame length; the head is oblong, with large whiſkers; the noſe blunt, with the noſtrils covered by a flap; the eyes large; ears large, oval, and naked; the ſpace round the noſe and eyes, and alſo beyond the ears, white; the ſides of the head and neck cinereous; back and ſides yellowiſh grey; breaſt and belly white; tail aſh-colour, and tinged more than half-way from the baſe with brown; the poſterior legs long in proportion to the fore legs, and the feet longitudinally black beneath; fore feet deſtitute of the thumb, but furniſhed inſtead with a warty tubercle.

This ſpecies inhabits the ſouthern parts of the Caſpian deſerts, and probably the warmer parts of Aſia; it delights in low grounds and ſalt marſhes, and burrows under the roots of the tamariſk buſhes, the fruit of which, together with the ſucculent maritime plants which it finds on the coaſts, conſtitute its principal food. Each burrow has two entrances, and is very deep; theſe animals are rarely ſeen, except in the night-time, when they quit their burrows in queſt of food.

Canadensis. Fore feet four-toed; poſterior five-toed; tail longer than the body, ringed, and briſtly. Jumping mouſe of Canada. Davies Mem. in Linn. Tranſ. *Canada rat*, Penn.

A ſmall ſpecies, apparently firſt deſcribed by general Davies, who had an opportunity of examining it during his reſidence in Quebec, and who has deſcribed it in the fourth volume of the Linnæan Tranſactions. The account is accompanied by drawings, repreſenting it both in its active and dormant ſtate, from two ſpecimens preſerved in the general's collection. With reſpect to the food, or mode of feeding of this animal, the general obſerves, it is not in his power to ſpeak with any degree of certainty; for though the firſt was taken alive, and lived a day and a half, it refuſed every kind of ſuſtenance, and the other was in a ſtate of torpidity when found, from which it never recovered. The firſt was taken in a large field near the falls of Montmorenci, and by its having ſtrayed too far from the ſkirts of the wood, allowed the writer, and three other gentlemen, to ſurround it, and after an hour's hard chaſe to capture it; the animal was much fatigued, and this, it is ſuppoſed, accelerated its death. During the time the animal remained in its uſual vigour, its agility was incredible for ſo ſmall a creature. It always took progreſſive leaps of from three to four, and ſometimes five yards, although ſeldom above twelve or fourteen inches from the ſurface of the graſs; but in ſhrubby places, and in woods among plants, where they chiefly reſide, they are obſerved to leap conſiderably higher. The example mentioned in a dormant ſtate was found by ſome workmen in digging the foundation for a ſummer-houſe in a gentleman's garden, within two miles of Quebec, the latter end of May. It was diſcovered incloſed in a ball of clay, about the ſize of a cricket ball, at the depth of twenty inches below the ſurface of the ground. This clayey covering was nearly an inch in thickneſs, and was broken by the ſtroke of a ſpade. It is preſumed theſe Canadian jerboas ſleep thus enveloped from the month of September till the end of May, or beginning of June following, and during that time take no ſuſtenance. The animal thus found, though preſerved in cotton, never revived; it is ſuppoſed that the heat of the apartment in which it was placed, and in which a ſtove fire was conſtantly kept burning, was too powerful for its reſpiration.

DIPYRE, in *Mineralogy*. The colour of this mineral is greyiſh or reddiſh-white, paſſing into roſe-red. It occurs either diſſeminated, or in ſmall faſcicular maſſes, or in minute priſmatic cryſtals. It has a brilliant vitreous luſtre, and a lamellar fracture parallel to the ſides of a regular hexahedron. It is moderately hard and brittle. Sp. gr. 2.63.

It is fuſible with ebullition before the blow-pipe, and is compoſed, according to Vauquelin's analyſis, of,

60	Silex.
24	Alumine.
10	Lime.
2	Water.
96	
4	Loſs.
100	

When pulverized and thrown on a hot coal, it gives a pale phoſphoric light. It occurs at Mauleon in the Pyrennées, imbedded in ſteatite.

DIPYRENON, from δις, and πυρην, a *berry*, in *Surgery*, the name of a probe, with a double button at the end, reſembling two ſmall berries growing together.

DIRACOUL, in *Geography*, a town of Aſiatic Turkey, in the Arabian Irak; 42 miles S. S. E. of Bagdad.

DIRÆ, called alſo *Deirea*, or *Deira*, a promontory and town on the ſouth-ſide of the ſtraits of Babelmandeb, in the Arabian gulf.

Diræ, in *Mythology*. See Furies.

DIRCA, in *Botany*, Mouſe-wood or Leather-wood, (its derivation we are unable to explain.) Linn. Gen. 192. Schreb. 260. Willd. Sp. Pl. v. 2. 424. Mart. Mill. Dict. v. 2 Juſſ. 77. Claſs and order, *Octandria Monogynia.* Nat. Ord. *Vepreculæ*, Linn. *Thymelææ*, Juſſ.

Gen. Ch. *Cal.* none. *Cor.* monopetalous, club-ſhaped; tube ſwelling upwards; limb ſlight, with an unequal border. *Stam.* Filaments eight, capillary, unequal, inſerted into the middle of the tube, and extending beyond the border; anthers roundiſh, erect. *Piſt* Germen ſuperior, ovate, with an oblique point; ſtyle longer than the ſtamens, capillary; ſtigma ſimple. *Peric.* Drupa roundiſh. *Seed* roundiſh, ſolitary.

Eſſ. Ch. Calyx none. Corolla tubular, with a ſlight unequal limb. Stamens and ſtyle longer than the corolla. Drupa with one ſeed.

D. *paluſtris.* Linn. Amoen. Acad. v. 3. 12. t. 1. f. 7. Sp. Pl. 512. Kalm's Travels, v. 2. 148. Ait. H. Kew. v. 2. 27. Du Hamel Arb. v. 1. 211. t. 212. (Thymelæa floribus albis, primo vere erumpentibus: foliis oblongis acuminatis: viminibus et cortice valdè tenacibus, unde *Leather-wood* appellatur. Gron. Virg. ed. 1. 155.) Grows on hills bordering on ſwamps and rivers in North America, flowering in April, while the leaves are only budding. *Stem* five or ſix feet high, branched, very tough and pliant, with a ſmooth bark as tough as leather. Hence it is uſed for making ropes, baſkets, and ſimilar economical purpoſes. *Leaves* alternate, ſtalked, elliptical, entire, downy when young. *Flowers* three from each bud, pendent, on ſhort ſtalks. *Stamens* and *ſtyle* protruding far beyond the corolla.

DIRCE, in *Ancient Geography*, the name of a ſtream or fountain of Greece, in Boeotia, placed by Plutarch near Thebes,

Thebes, and ſaid by Pauſanias to diſcharge itſelf into the Iſmenus. Pindar is ſaid to have had his houſe near the river Dirce.

DIRE, in *Geography*, a town of Bohemia, in the circle of Leitmeritz; 6 miles S. of Leipa.

DIREA, or Deira, a town of Greece, in Attica.

DIRECT, in *Arithmetic*. The rule of three direct is that oppoſite to the inverſe. See Rule *of proportion.*

Direct, in *Aſtronomy*. We conſider the planets in three ſtates; *viz.* direct, ſtationary, and retrograde. See Planet.

They are ſaid to be direct, when they appear to move forward, according to the ſucceſſion of the ſigns; and retrograde, when they go the contrary way.

Direct, in *Matters of Genealogy*, is underſtood of the principal line, or the line of aſcendants and deſcendants; in contradiſtinction to the collateral line. See Descent.

A very good hiſtorian uſes the phraſe *direct* ſpeech, or harangue, when he introduces any one ſpeaking, or haranguing of himſelf: when the hiſtorian ſpeaks, and only rehearſes the chief points of what was delivered by the ſpeaker, it is called an *indirect* ſpeech.

Direct $\left\{\begin{matrix}\textit{Erect}\\\textit{Eaſt}\\\textit{Weſt}\end{matrix}\right\}$ *dials*, are thoſe whoſe planes lie directly open to the eaſt, or weſt points of the heavens, or parallel to the meridian of the place. See Dial.

Direct *ſouth*, or *north* $\left\{\begin{matrix}\textit{Inclining}\\\textit{Reclining}\end{matrix}\right\}$ *dials*. See Dial.

Direct, in *Muſic*, is a mark ſet at the end of a ſtaff, eſpecially at the foot of a page upon that line or ſpace where the firſt note of the next ſtaff is ſet.

Direct, in *Optics*. Direct viſion is that performed by direct rays; in contradiſtinction to viſion by refracted, or reflected rays. Direct viſion is the ſubject of optics, which preſcribes the laws and rules thereof. See Vision.

Direct *rays*, are thoſe which paſs in right lines from the luminary to the eye, without being turned out of their rectilinear direction by any intermediate body, either opaque or pellucid. See Ray.

Direct *ſphere.* See Right *ſphere.*

DIRECTION, in *Aſtronomy*, the motion, and other phenomena, of a planet, when *direct.* See Planet.

Direction, in *Aſtrology*, is a kind of calculus, whereby they pretend to find the time wherein any notable accident ſhall befal the perſon whoſe horoſcope is drawn.

For inſtance, having eſtabliſhed the ſun, moon, or aſcendant, as maſters, or ſignificators of life; and Mars, or Saturn, as promiſers, or portenders, of death; the direction is a calculation of the time wherein the ſignificator ſhall meet the portender.

The ſignificator they likewiſe call apheta, or giver of life; and the promiſer, anereta, promiſſor, or giver of death.

They work the directions of all the principal points of the heavens, and ſtars, as the aſcendant, mid-heaven, ſun, moon, and part of fortune. The like is done for the planets, and fixed ſtars; but all differently, according to the different authors.

Direction, *Iſlands of*, in *Geography*, four ſmall iſlands at the W. entrance of the ſtraits of Magellan, in the ſouth Pacific ocean. S. lat. 52° 27′. W. long. 77° 19′.—Alſo, a cluſter of iſlands on the eaſt coaſt of New Holland, three of which are within the paſſage or channel, through which Cook in 1770 paſſed into the open ſea beyond the reef, and which lies in S. lat. 14° 32′. They were ſo called, becauſe by theſe a ſtranger may find a free paſſage through the reef quite to the main. The largeſt, and the northernmoſt of the three, is called *Lizard* iſland, which ſee.

Direction, *line of*, in *Gunnery*, was formerly marked on guns with a ſlit or cavity at the breech, and a button at the muzzle, ſo that they were directed in the ſame manner as fowling-pieces are; but as the platforms on which the cart carriages reſt are never laid ſo exactly level, but that one wheel is always higher than another, this line of direction muſt be falſe, and has, therefore, in modern practice, been laid aſide; and the centre-line of a piece is found every time it is fired, by a plummet, or inſtrument, which Mr. Muller complains of as a tedious and uncertain method; and he recommends reſuming the line of direction, as more expeditious, and more certain than the common practice. Syſtem of Math. vol. v. p. 90 and 230.

Direction *of Motion*, in *Mechanics*, denotes the ſituation of the ſtraight line along which any particular motion is performed. Thus, let A B, (*Plate* XXII. *Mechanics, fig.* 3,) repreſent the two extreme points of a ſtraight line, and ſuppoſe that a body moves from A to B along that ſtraight line; then A B is ſaid to be the direction of the motion of that body. Should the body move from the point B to the point A; then BA is the direction of its motion, which is contrary to the former. The laws of motion, as explained by ſir Iſaac Newton, ſtate, that a body in motion will continue to move in a ſtraight line, unleſs it be compelled to change that direction, by a force or forces impreſſed, and independent of that which originally put it in motion. Therefore, when a body moves in a curve, it muſt be continually deflected from its ſtraight direction by the action of ſome other force, which conſtantly acts upon it; hence when a body moves in a curvilinear path, the direction of its motion is not ſaid to be that curve line; but it is ſaid that the body changes its direction at every point of its courſe, or continually. Conſequently the direction of a body ſo moving, at any particular point of its courſe, is the tangent at that particular point of the curvilinear path. In fact, if, when a body moves in a curve, the ſecondary force which acts upon it, beſides the original impulſe, ceaſes to act, then the body will fly off in the direction of the tangent at that particular point of the curve, at which the body ſtood when the ſecondary force ceaſed to act.

Direction, *line of*, is a ſtraight line ſuppoſed to be drawn from the centre of gravity of that body to the centre of the earth; and if a body be left unſupported, it will fall, or move, downwards, in that direction; for ſince the momenta of all the particles of a body, that are on one ſide of its centre of gravity, are exactly equal to, or balanced by, the momenta of all the particles which are on the other ſide of that centre, it follows that the whole body muſt riſe or fall according as its centre of gravity riſes or falls: and when the body falls in conſequence of its own gravity, *viz.* in conſequence of its being attracted by the earth, the mutual forces of thoſe two bodies towards each other are concentrated in their centres of gravity; hence the body falls in the direction of the line which joins thoſe centres, or the line of direction. It will eaſily appear upon the leaſt conſideration, that the lines of direction of different bodies are not ſtrictly parallel; for they all converge towards the centre of the earth. Yet, with reſpect to any body, or ſyſtem of bodies, connected for mechanical purpoſes, the whole ſpace in which their particles are included and move is ſo very ſmall in proportion to the body of the earth, that their ſeveral lines of direction may, without any ſenſible error, be conſidered as perfectly parallel.

It is evident, from the preceding obſervations, that a body may

may be supported by another body, when the latter is perpendicularly under the centre of gravity of the former; otherwise the former will fall off, or, in other words, a body will stand upon a base when its line of direction falls within that base, and not otherwise. This principle is generally and necessarily attended to in all movements either natural or artificial; as will be clearly illustrated by the following applications: A B E C, *fig.* 4, is an inclined body, say a block of stone, and H is its centre of gravity. H D is a perpendicular let fall from its centre of gravity, and of course is its line of direction; it being the straight line which passes through the centre of gravity of the body and that of the earth. Now, since the line of direction H D falls within the base A C, the body will remain in that situation; but if an additional weight F B be laid upon it, the centre of gravity of the whole will be at I, and the line of direction I O will fall without the base, in consequence of which the whole compound body A G will fall down. "Hence (Mr. Ferguson observes) appears the absurdity of people's rising hastily in a coach or boat when it is likely to overset; for by that means they raise the centre of gravity so far as to endanger throwing it quite out of the base; and if they do, they overset the whole effectually: whereas, had they clapt down to the bottom, they would have brought the line of direction, and consequently the centre of gravity, farther within the base, and by that means might have saved themselves."

This likewise shews the impropriety of building high carriages, like the very high phaetons that were in fashion a few years ago.

If attentively considered, the whole motion of the body of an animal will be found to depend upon a proper regulation of the line of direction. When the line of direction falls within our feet; that is, within the base which is formed by our feet, we stand, and most firmly when that line falls in the very middle of that base; but we instantly begin to fall the moment in which the line of direction goes beyond that base. And it is curious to observe how nature, or our unsuspected experience, instructs us in the use of those methods and those positions, which either maintain our necessary position, or restore it when lost. When we rise from a chair, we bend our bodies forward, by which means the line of direction falls forward beyond our feet, which obliges us to move a foot forward, in order to prevent the fall. For the same reason, a man leans forward when he carries a burthen on his back, but leans backward when he carries it on his breast; also he leans on one side when he carries a weight, as a pail of water, &c. on the opposite side. In walking, a man first extends his hindmost leg and foot nearly straight, and at the same time bends the knee of his fore-leg a little; by this means his body is thrust forward, and the line of direction from his centre of gravity falls beyond the fore-foot, on which account his fall would ensue, but he prevents it by immediately taking up the other foot, and putting it forward beyond the line of direction; after the same manner, he thrusts himself forward by extending the leg which is now the hindmost, till the line of direction be advanced beyond his fore-foot, when he again prevents his fall by advancing the other foot, and so forth.

In the situation of bodies of all sorts this general principle must be attended to; namely, that the broader the base is, and the nearer the line of direction is to the middle of that base, the more steadily will a body stand upon it: and, on the other hand, the narrower the base is, and the nearer the line of direction is to the side of it, the more easily may a body be overthrown; for in this case the slightest change of position will throw the line of direction quite out of the base. Hence it follows, that a globular body is easily rolled upon a plain horizontal surface, and that it is extremely difficult to let an egg stand on one end, or any other pointed body stand upon its point.

We shall, lastly, observe, that in case of bodies placed upon inclined planes, a body will slide down the plane, when its line of direction falls within its base, as in *fig.* 5; but the body will fall down, or roll, when its line of direction falls without its base, as in *fig.* 6.

Direction, *Angle of*, is that comprehended between the lines of direction of two conspiring powers.

Direction, *Quantity of*, is used for the product of the velocity of the common centre of gravity in a system of bodies, by the sum of their masses.

In the collision of bodies, the quantity of direction is the same before and after the impulse. Bernouilli, Discours sur le Movement. Oper. tom. iii. p. 32, and 56.

Direction *Chamber*, in *Commerce*. See Chamber.

Direction, *Number of*, in *Chronology*. See Number.

DIRECTING Plane, in *Perspective*. A plane passing through the eye (or point of sight) parallel to the original plane, is called the directing plane; and the intersection of the original plane with the directing plane, is called the directing line.

There is a plane which is at the same time perpendicular to the original plane, to the plane of the picture, to the vanishing plane, and the directing plane; this is called the vertical plane, and its intersection with the directing plane is called by some writers the director of the eye. It is taken as the height of the eye above the original plane. The point in which the director intersects the directing line is called the station point.

DIRECTIVE *Property of the Magnet*, is the power which the magnet or a magnetized body, has of placing itself in the magnetic line; provided it be left at liberty, or be so suspended as to be able to move itself with freedom. The magnetic line in London is inclined by about 72° 30′ below the horizon, and the vertical plane of it, or through which it passes, cuts the horizon at an angle of about 24° from the north point of it towards the west. See Magnetism, Compass, and Dipping *Needle*.

DIRECTLY, in *Geometry*; we say, two lines lie directly against each other, when they are parts of the same right line.

In *Mechanics*, a body is said to strike, or impinge directly against another, if it strike in a right line perpendicular to the point of contact.

A sphere, particularly, strikes directly against another when the line of direction passes through both their centres. See Percussion.

DIRECTOR, in *Commercial Polity*, a person who has the management of the affairs of a trading company: thus we say the directors of the India company, South-sea company, &c. See Bank.

Directors *of Creditors*, in the *Commercial Policy of France*, are persons of ability and property, chosen by votes of the creditors, to inspect and examine the debtor's affairs, and to procure as far as possible, by common methods of justice, the payment of each person's debt. See Assignees.

Directors-*General* of the five great farms of the gabele and aids, &c. in France, are chief commissioners, who have the direction of these farms, each in the districts appointed by the general farmers.

Director, in *Surgery*, is a grooved instrument to conduct the surgeon's knife in several operations, which would otherwise endanger his cutting the subjacent parts. Directors are usually made of steel or silver; and they vary in

in ſhape, according to the form or ſtructure of the part to be operated upon. In ſome caſes the ſurgeon's finger is the beſt director. See CONDUCTOR.

DIRECTOR *Penis*, in *Anatomy*, a muſcle of the penis, called more uſually erector. See ERECTOR.

DIRECTORY *of Public Worſhip*, was drawn up by the aſſembly of divines at Weſtminſter, and eſtabliſhed by an ordinance of parliament, in 1644, repealing the ſtatutes of Edward VI. and of Elizabeth, for uniformity in the common prayer. The directory ſet aſide the uſe of the liturgy, and allowed of no church-muſic beſides that of ſinging the Pſalms.

Inſtead of one preſcribed form of prayer, the directory only points out certain topics, on which the miniſter might enlarge. The whole apocrypha was rejected; and both private baptiſm and lay baptiſm, with the uſe of godfathers and god-mothers, and the ſign of the croſs, were diſcontinued. In the ſacrament of the Lord's ſupper, no mention is made of private communion or adminiſtering it to the ſick. The altar with rails was changed into a communion table, about which the people might ſtand or ſit; kneeling not being thought ſo proper a poſture. Lightfoot, Selden, and others were for open communion, to which the parliament alſo moſt inclined, in oppoſition to thoſe preſbyterians who were for granting powers of admiſſion or rejection to the miniſters and elders, and to the independents who were for committing them to the whole brotherhood; but it was agreed, that the miniſter, before the communion, ſhould warn, in the name of Chriſt, all ſuch as are ignorant, ſcandalous, prophane, or that live in any ſin or offence againſt their knowledge or conſcience, that they preſume not to come to that holy table, ſhewing them, that he that eateth and drinketh unworthily, eateth and drinketh judgment to himſelf. The prohibition of marriage in Lent, and the uſe of the ring, were laid aſide. In the viſitation of the ſick no mention is made of private confeſſion, or authoritative abſolution. No ſervice is appointed for the burial of the dead. All particular veſtments for prieſts or miniſters, and all ſaints-days were diſcarded. It has been remarked, as a conſiderable omiſſion, that the directory does not enjoin the reading of the apoſtles' creed, and the ten commandments. However, theſe were added to the aſſembly's confeſſion of faith, which was publiſhed a year or two afterwards. This directory continued in uſe till the reſtoration of king Charles II., when, the conſtitution being reſtored, the old liturgy took place again; the ordinance for its repeal having never obtained the royal aſſent. The revolution, thus occaſioned in the form of public worſhip, did not take place for a conſiderable time over the whole kingdom. In ſome parts of the country the church-wardens could not procure a directory; and in others they deſpiſed it, and continued the old common prayer book; ſome would read no form, and others uſed one of their own. In order to enforce the uſe of the directory, the parliament, by an ordinance, [dated Auguſt 23, 1645, called in all common prayer books, and impoſed a fine upon thoſe miniſters who ſhould read any other form than that contained in the directory. Such, as Mr. Neale very juſtly obſerves, (Hiſt. of the Puritans, vol. ii. p. 109, 4to.) were the firſt fruits of preſbyterian uniformity, and they are equally to be condemned with the ſeverities and oppreſſions that had been the ſubjects of former complaints; for though it ſhould be admitted, that the parliament or legiſlature had a right to abrogate the uſe of the common prayer book in churches, was it not highly unreaſonable to forbid the reading of it in private families or cloſets? Surely the devotion of a private family could be no diſturbance to the public; nor is it any excuſe to ſay, that very few ſuffered by it, becauſe the law is ſtill the ſame, and equally injurious to the rights of mankind. By an ordinance, Auguſt 23, 1645, which continued till the reſtoration, to preach, write, or print any thing in derogation or depraving of the directory, ſubjected the offender, upon indictment, to a diſcretionary fine, not exceeding 50*l*. The king's proclamation at Oxford, dated November 13, 1645, forbidding the uſe of the new directory, and enjoining the continuance of the common prayer, was of no avail.

DIRECTORY *part of a Law*, ſtands much upon the ſame footing with the *declaratory* (which ſee); for this virtually includes the former; the declaration being uſually collected from the direction.

DIRECTRIX, in *Geometry*. See DIRIGENT.

DIRECTRIX *of the parabola*. See CONIC *Sections*.

DIRENKRUTT, in *Geography*, a town of Germany, in the archduchy of Auſtria, 5 miles S. E. of Ziſterſdorff.

DIRENOW, a river of Germany, in the circle of Upper Saxony, which runs from the Groſs Haff into the Baltic.

DIRIBITORES, among the Romans, officers appointed to diſtribute tablets to the people at the Comitia. See COMITIA.

DIRIBITORIUM, in *Roman Antiquity*, an immenſe building at Rome, which, according to Dion Caſſius, was the largeſt that was ever incloſed under one roof, and of ſuch ſize, that when it decayed by age, no perſon was able to repair it; and, therefore, it was quite open in the time of that hiſtorian. This building was begun by Agrippa, and finiſhed by Auguſtus. Its uſe has not been aſcertained; but it might probably have been intended for the accommodation of numerous aſſemblies of the people, when it would have been inconvenient, on account of heat, or cold, or rain, for them to have met together in places that were uncovered.

DIRIGENT, a term in *Geometry*, expreſſing the line of motion, along which a deſcribent line, or ſurface, is carried in the geneſis of any plane, or ſolid figure.

Thus, if the line A B (*Plate* VI. *Geometry*, *fig.* 80.) move parallel to itſelf, and along the line A C, ſo that the point A always keeps in the line A C, a parallelogram, as A B C D, will be formed, of which the ſide A B is the deſcribent, and the line A C the *dirigent*. So alſo if the ſurface A B C D be ſuppoſed to be carried along the line C E, in a poſition always parallel to itſelf in its firſt ſituation, the ſolid A D E H will be formed, where the ſurface A D is the deſcribent, and the line C E is the dirigent.

DIRIGOTHIA, in *Ancient Geography*, a town of Lower Mœſia, the ſame with Dirogetia, now *Drimago*.

DIRITTA, in the *Italian Muſic*, a term intimating that the piece is be played or ſung in conjoint degrees. Thus, contrapunto alla diritta, according to Angelo Berardi, is when one is obliged to raiſe or fall the voice by the ſame degrees, i. e. by an equal number aſcending or deſcending, without making a leap, even of the interval of a third. Broſs. Dict. Muſ. in voc.

DIRMSTEIN, in *Geography*, a town of Germany, in the circle of the Upper Rhine, and biſhopric of Worms; 7 miles S. S. W. of Worms.

DIRPHYS, in *Ancient Geography*, a mountain in the iſland of Eubœa.

DIRRITORF, in *Geography*, a town of Germany, in the archduchy of Auſtria; pillaged and deſtroyed in 1310; 3 miles N. of Steyr.

DIRSCHAU, a ſmall town of Pruſſia, on the Viſtula, ſituated in a very fertile country. It was built in 1209, and had

had its own earls, when the knights of the Teutonic order invaded and conquered Pruffia. Dirfchau is 15 miles S. of Dantzic, and fince the peace of Tilfit forms a part of its dominions.

DIRSCHKEIM, a fmall town of Pruffia, in German Samland, in the diftrict of Fifchhaufen.

DIRT-BOAT, in *Canal-making*, &c. fignifies a *Float*, or *flat bottomed Boat*, generally with fquare ends, and very fhallow, ufed upon a canal for moving earth or other materials for the repair of the banks, &c. See CANAL.

DIRUTA, GIROLAMO, in *Biography*, organift of the cathedral at Chioggia in 1615, publifhed in Italian at Venice, in fol. a book on mufic, entitled, "Il Tranfilvanio," in dialogue between the author and his fcholar, a prince of Tranfilvania. It contains inftructions for playing the organ and other keyed inftruments, with preludes by moft of the celebrated organifts of Italy at the time; but in thefe no keys are ufed but thofe of the church, and all the paffages confift of running up and down the fcale with both hands, alternately, without other intention than to exercife the fingers in the moft obvious and vulgar divifions then in ufe.

DIS, an infeparable particle prefixed to divers words; the effect whereof is, either to give them a fignification contrary to what the fimple words had: as in difgrace, difparity, difproportion, &c. or to intimate a feparation, detachment, diftribution, &c. as in difcerning, difcourfing, diftracting, difpofing, &c.

DISA, in *Botany*, (a name contrived by Bergius, poffibly from Δις, *Jupiter*, to exprefs a female divinity, in allufion to the magnificence and beauty of the flower, exceeding moft of its tribe, and to preferve an analogy with fome others of that tribe, *Arethufa*, *Cypripedium*, *Serapias*, &c.) Berg. Cap. 348. t. 4. f. 7. Linn. Suppl. 59. Schreb. 605. Willd. Sp. Pl. v. 4. 45. Juff. 65. Swartz. Orchid. 24. t. 1. f. B. Clafs and order, *Gynandria Monandria*. Nat. Ord. *Orchideæ*.

Gen. Ch. *Cal.* perianth of 3 leaves, generally reverfed; the two foremoft nearly upright; the back one (which, from the ufual reverfe pofture of the flower, becomes foremoft), nearly upright, concave or vaulted, producing from its central or bottom part, a pofterior fpur. *Cor.* petals 2, fmaller than the calyx-leaves, various in form, attached on each fide to the columnar part of the ftyle. Nectary or lip between the two foremoft calyx-leaves, inferted before the bafe of the ftyle, deftitute of a fpur, and rarely divided. *Stam.* and *Pift.* Germen inferior, oblong; ftyle very fhort; ftigma in front, near the bafe of the ftyle, globofe; anther oblong, of two cells, parallel to the ftyle, and connected with it lengthwife, erect or incumbent, bent back with the petals towards the fpurred leaf of the calyx; pollen in two club-fhaped glutinous maffes, with a glandular bafe. *Peric.* Capfule oblong or obovate, triangular, of three valves and one cell, burfting at each angle, the top and bottom remaining entire. *Seeds* numerous, minute, roundifh, each with a membranous tunic.

Eff. Ch. Calyx fpreading, moftly reverfed; one leaf fpurred behind. Petals attached to the ftyle. Lip without a fpur. Anther parallel to the ftyle.

Swartz enumerates 28 fpecies of *Difa*, all natives of the Cape of Good Hope, of which the firft *D. grandiflora*, (*D. uniflora* of Bergius, who founded the genus,) is one of the fineft of this natural order. Its flower is red, and elegantly veined. The maffes of pollen are larger and more ftriking than in any other of the *Orchideæ*. *Orchis draconis*, *biflora*, *flexuofa*, *tenella*, *fagittalis*, *barbata*, *tripetaloides*, *fpatulata*, *bivalvata* and *patens* of Linnæus, are all removed by Swartz to this genus, as well as his *filicornis*, which feems to us fcarcely diftinct from the laft.

DISABILITY, in *Law*, is when a man is made incapable to inherit lands, or take any benefit, which otherwife he might do, which may happen four ways; *viz.* by the act of the anceftor; by the act of the party; by the act of law; and by the act of God.

DISABILITY *by the act of the anceftor*, is where the man is attainted of treafon, or felony; by which attainder his blood is corrupted, and thereby himfelf and his children are difabled to inherit.

DISABILITY *by the act of the party himfelf*, is where a man binds himfelf by obligation, that upon the furrender of a leafe, he will grant a new eftate to the leffee; and afterwards he grants the reverfion to another, which puts it out of his power to perform it.

DISABILITY *by the act of the law*, is when a man, by the fole act of law, without any thing by him done, is rendered incapable of the benefit of the law: as, an alien born; fo that if a man born out of the king's liegeance, will fue an action, the tenant, or defendant, may fay, he was born in fuch a country out of the king's liegeance, and demand judgment, if he fhall be anfwered: for the law is our birth-right, to which an alien is a ftranger, and therefore difabled from taking any benefit thereby.

DISABILITY *by the act of God*, is when the party is *non compos mentis*, or *non fanæ memoriæ*, which fo difables him, that in all cafes where he gives, or paffes any thing, or eftate from him, after his death it may be annulled and avoided.

There are alfo other difabilities by the common law, as of idiocy, infancy, and coverture, for making of grants, &c. and by ftatute, as Papifts are difabled for making any prefentation to a church, &c. and officers not taking the oaths for holding offices.

DISABILITY *of the plaintiff, plea to*. See DILATORY *Pleas*.

DISABLED, in *Sea Language*, is applied to a fhip, when, by the lofs of her mafts, yards, or rigging, or other damage, fhe is rendered incapable of profecuting her voyage, without great difficulty and danger.

DISABLING *a man's limbs or members*, in *Law*. See MAYHEM.

DISAFFORESTED. See DEAFFORESTED.

DISANDRA, in *Botany*, (of obfcure etymology, unlefs Linnæus meant *Dyfandra*, from δυς and ανηρ, alluding to the great uncertainty in the number of its ftamens, and the confequent difficulty of referring it to any of his claffes, which induced him to place it in *Heptandria*, where it might moft eafily be feen; as was the cafe likewife with *Aponogeton*, Suppl. 33.) Linn. Syft. Veg. ed. 13. 290. Suppl. 32. Schreb. 244. Willd. Sp. Pl. v. 2. 282. Mart. Mill. Dict. v. 2. Juff. 99. Clafs and order, *Heptandria Monogynia*. Nat. Ord. *Pediculares*, Juff.

Gen. Ch. *Cal.* Perianth bell-fhaped, divided half-way down into from five to eight oblong, nearly ftraight, fegments, permanent. *Cor.* of one petal, wheel-fhaped; tube very fhort; limb in from five to eight deep, obovate, equal divifions. *Stam.* Filaments five to eight, fetaceous, fomewhat fpreading, equal, inferted into the tube, fhorter than the limb; anthers arrow-fhaped. *Pift.* Germen fuperior, ovate; ftyle thread-fhaped, the length of the ftamens; ftigma fimple. *Peric.* Capfule ovate, the length of the calyx, of two cells. *Seeds* numerous, ovate.

Eff. Ch. Calyx in about feven divifions. Corolla wheel-fhaped, with about feven equal fegments. Capfule fuperior, of two cells, with many feeds.

D. *proftrata*, Curt. Mag. v. 7. 218, (Sibthorpia peregrina; Linn. Sp. Pl. 880,) is the only fpecies, a native of Madeira,

Madeira, as well as of the Levant. The *ſtems* trail on the ground, or are pendent from rocks and ſtones in an elegant manner, clothed with alternate, ſtalked, kidney-ſhaped, crenate, downy *leaves*, and altogether reſembling the ſhoots of ground ivy. *Flower-ſtalks* axillary, cluſtered, ſingle-flowered, downy. *Bloſſoms* yellow. This plant is now become common in green-houſes, where it appears to advantage, as Curtis remarks, if placed on a pedeſtal, ſo that its branches may hang careleſsly down. It is eaſily propagated by cuttings, requires rich earth, and in dry weather plenty of water, bloſſoming throughout the ſummer, and indeed whenever the weather is favourable for any vegetation.

Shaw's *Chryſoſplenii foliis planta aquatica, flore flavo, pentapetalo,* Spec. Phyt. Afr. f. 149. on which Linnæus founded his *Sibthorpia africana*, Sp. Pl. 880. appears to be this very plant, not even a variety, except ſo far as the bad drawing of his figure makes it unlike nature.

DISAPPOINTMENT, in *Geography*, a bay on the N. W. coaſt of North America. N. lat. 52° 15′. W. long. 129°.

Disappointment *Iſland*, an iſland in the South ſea, ſo called by the Miſſionary voyagers in 1797, being one of the cluſter called by them "Duff's Group;" they are about 11 in number, lying in a direction S. E. and N. W. 14 or 15 miles: in the middle are two larger iſlands about ſix miles in circumference. On the N. W. ſide of the group are five or ſix more, ſome of which are high; and at the eaſt end of one of them is a remarkable rock in form of an obeliſk. The ſmall iſlands were apparently barren; but the two largeſt were entirely covered with wood, among which were ſeveral cocoa-nut trees; but, upon the whole, they exhibited no appearance of great fertility. The natives ſeemed to be ſtout and well made, with copper-coloured complexions: their houſes were built cloſe to each other, and not diſperſed, as in other places: a horde of their dwellings was ſituated on the S.W. ſide of Diſappointment iſland; in S. lat 9° 57′. E. long. 167°. Miſſ. Voyage, p. 296.

Disappointment, *Iſlands of*, a cluſter of iſlands in the South Pacific ocean, ſo called by commodore Byron in 1765, becauſe he found it impoſſible to procure at them any refreſhment for his ſick crew. The middle of this cluſter lies in S. lat. 14° 10′. W. long. 144° 52′. The variation of the compaſs was here 4° 30′ E.

DISARM, in the *Manege*. To diſarm the lips of a horſe, is to keep them ſubject, and out from above the bars, when they are ſo large as to cover them, and prevent the true preſſure or appui of the mouth, by bearing up the bit, and ſo rendering the horſe to feel the effects of it upon the bars.

Disarm. To diſarm a regiment is generally conſidered as a diſgrace, and uſually precedes its being diſembodied; becauſe, when the arms are only laid by for a while, they are ſaid to be depoſited; and when they are turned over to another corps, they are always ſuppoſed to be exchanged by the ſupply of new ones. We rarely hear of a regiment being diſarmed, except where mutiny has taken place, or that diſobedience is expected. In ſuch caſe the utmoſt precaution ſhould neceſſarily be taken; it being extremely difficult to induce ſoldiers to ſurrender their weapons; more particularly where they harbour miſchievous deſigns, or are under the influence of ſeditious perſons. Perhaps no mode is ſo efficacious as dividing them into ſmall parties, and diſarming them in detail.

When armies, or bodies of ſufficient force to entitle them to deference, are compelled to ſurrender, it is generally contended by them, that their arms, artillery, and baggage ſhould be allowed them. This admits of various modifications. In ſome inſtances, where prudence dictates to a conquering general not to make any difficulties, but to get rid of an enemy, at any rate, the foregoing terms have been allowed, and the vanquiſhed force has been allowed to march away with all the honours of war; that is, colours flying, drums beating, matches lighted, bayonets fixed, ſwords drawn, cannon untimbered, and, in fact, as though in a ſtate of defiance. In other inſtances, the honours of war are granted conditionally, and the proceſſion ceaſes after evacuating a fortreſs; when the garriſon march out, (but not away) in full diſplay, and at an appointed ſpot, ſurrender their artillery, and after grounding their arms, and taking off their pouches and belts, move from, and ſurrender them to the victors. But even here we have many varieties; it being ſometimes a condition that the officers ſhall retain their ſide arms; in others, that they ſhall retain them until embarked only, ſo as to ſave appearances for a while.

According to the modern mode of warfare, we ordinarily find but little ceremony uſed; for the moſt part the whole ſurrendering as priſoners of war, and all delivering up their arms without reſervation. It is, however, uſual, and no doubt proper, to grant ſome honourable diſtinctions to an enemy who has refrained from pillaging, and has carried on his operations with as little injury as poſſible towards the country in general. Formerly there were particular rules faſtidiouſly eſtabliſhed among the great commanders, not leſs formal than their court ceremonies; but ſince our enemies have laid aſide all feeling, generoſity, and humanity, it has become indiſpenſably neceſſary for our generals to diſarm their priſoners, and to be very circumſpect in granting any indulgence, or honourable type, to perſons who are inſenſible to the dignity and pride of the military profeſſion.

On the concluſion of a peace, it is uſual for both ſides to diſarm. We have divers laws for diſarming papiſts, and all recuſants. Under king George I. a law was made for diſarming the Highlanders; none of whom, except peers, or gentlemen of 400*l. per ann.* are to wear any arms in the field, on the road, or at market. 1 Geo. I. ſtat. 2. cap. 54.

The game law has, in effect, diſarmed all the common people of England, having under 100*l.* a year in landed eſtate, except the ſervants of lords of manors. Yet, by the ancient policy of England, the whole nation was obliged to bear arms. See Game *Laws*.

DISARRHENUM, in *Botany*, (from δὶς, *double*, and ἄῤῥην, a *male*, becauſe of the two lateral male florets,) a genus founded by La Billardiere, in his Novæ Hollandiæ Plantarum Specimen, of which he gives a plate and the following account. Claſs and order, *Polygamia Monoecia* (rather *Triandria Digynia*). Nat. Ord. *Gramina*.

Eſſ. Ch. *Cal.* Glume of two valves, containing three florets, the central one hermaphrodite, the two lateral ones male. The former has a *Corolla* of two valves, without awns; three ſtamens; two ſtyles; one ſeed: the latter have the outer valve of the corolla awned; and three ſtamens.

D. *antarcticum*. A graſs half a fathom and more in height, with a ſtriated *ſtem*, and ſquarroſe ſtriated *leaves*. *Stipula* torn. *Panicle* rather leaning to one ſide. The habit is that of a *Holcus*, and the author ſuſpects *H. latifolius* and *odoratus* of Linnæus may prove of this genus, and that *Ariſtida antarctica* of Forſter may be the very ſame plant.

DISBAND, in a *Military Senſe*, relates to the diſorganization of a body of men, by allowing the ſoldiers to retire from the ſervice; in contradiſtinction to *reducing* a battalion by draughting the men into other battalions. When a corps

corps is difbanded, its colours are, in general, depofited in fome public arfenal, and the drums, &c. are preferved in the ftate in which they are at the time of difbanding; efpecially if it be a regiment of the line; in order that the whole may be in readinefs whenever the fame number may be again brought upon the ftrength of effective regiments. In difbanded regiments the officers are put on half pay. In fome fervices, when regiments have been difbanded, or rather *broke*, for bad behaviour, their colours have been burnt, and the numbers of thofe regiments kept vacant, no corps being allowed to fupply the place of the difgraced regiments. But a regiment is not confidered as difbanded until it has ceafed in every cafe to be effective: then, when, in unfavourable climates a regiment may be fo much reduced as to render it unfit for field fervice, it is ufual to draught the privates, and to fend the officers, ferjeants, and corporals home with the colours, to recruit the corps to its former ftrength; in fact, to raife a new one. But if there fhould appear no further occafion for their fervices, the commiffioned officers are placed on half pay, and the non-commiffioned are removed to fome other regiment. This is literally *difbanding*, and can only take place by order of his majefty; it not being within the authority of any other perfon to abrogate the king's commiffion; though generally, on foreign ftations, difcretionary power is vefted in local commanders in chief to approve, and to carry into effect, the fentences of courts-martial, whereby thofe officers who trefpafs againft the articles of war may be deprived of their commiffions, or eventually fuffer capital punifhment.

The difbanding of a corps is attended with fome form. The king's commiffion is ufually read on the parade, by the governor, or deputy-governor, of the fortrefs, or by the commanding officer of the diftrict, and the colours are marched away under a guard; the arms and the accoutrements, together with the ftores, being all delivered up to perfons appointed to receive them. The foldiers receive their written or printed difcharges, and are, in fome cafes, forwarded to their refpective homes at the public expence; the billets are cancelled, and the whole difperfe. This fcene cannot be witneffed without fome emotion: men who have fuftained their country's honour, and who are mutually indebted to each other's perfonal prowefs, for fuccour in the hour of danger, affociated too for probably many, many years, cannot but feel, intermingled with the joy of approaching their long eftranged families, fome reluctance at the feparation from each other, and from officers who had gained their affections by kindnefs, and good example!

DISBOSCATION, Disboscatio, a turning wood-ground into arable or pafture, an affarting. See Assart.

DISBURDENING *of* Trees, in *Gardening*, the taking off leaves and fruits when too numerous, that thofe left may grow the larger.

DISC, or Disk, *Difcus*, in *Antiquity*, a kind of round quoit, or a piece of ftone, or metal, or wood, about a foot over, ufed by the ancients in their exercifes.

The difcus of the ancients was flat and round, refembling the apparent figure of the fun.

The exercife of the difcus was one of thofe practifed in the folemnities of their public games; it confifted in pitching, or throwing a difcus either upward, or ftraight forward; and he who threw it higheft, or fartheft, bore away the prize.

Thofe who practifed at this game were called *difcoboli, i.e.* throwers of the difcus.

The poets tell us, that Hyacinth, a favourite of Apollo, playing at the difcus with that god, was killed by a blow of Apollo's difcus, which his rival Zephyrus diverted from its courfe, and caft on the boy's head.

The difcus was thrown by means of a little cord made of hair, as appears from Claudian, lib. ii. in Eutrop. carm. 20. ver. 359, et feq. Ovid defcribes this fport, Metam. lib. x. ver. 175. The Romans learnt the game of the difcus of the Greeks, and practifed it among themfelves. Dempfter, Paraleip. in Rofin. Antiq. Rom. lib. v. cap. 1. and Pet. Faber. Agonifticon, lib. ii. cap. 1. treat of the diverfion of the difcus.

Disc, or *Difk*, in *Aftronomy*, the body or face of the fun, or moon; fuch as it appears to us. For, though they are really fpherical bodies, they are apparently circular planes.

The difc is conceived to be divided into twelve equal parts, called digits; by means whereof it is that the magnitude of an eclipfe is meafured, or eftimated. See Digit and Eclipse.

Disc, *illuminated, of the earth*. See Circle *of illumination*.

Disc, in *Optics*, the magnitude of a telefcope glafs; or the width of its aperture, whatever its figure be, whether a plain, convex, menifcus, or the like.

Disc, in the Greek *Liturgy*, is nearly the fame thing with the patena in the Latin. See Patena.

In the Greek church, the confecrated bread is laid on a difcus, as in the Latin church it is on a patena. The difcus only differs from the patena, in that it is bigger and deeper, as refembling a plate, which was the proper fignification of the word difcus among the ancients.

DISCALCEATED, (Discalceati, unfhod,) certain orders or reformations of friars and nuns, fo called from their going bare-footed, or ufing fandals inftead of fhoes.

DISCANT, in *Mufic*, from *difcantus*, Lat. founding twice. The Englifh verb, *to defcant*, is derived from the Fr. *déchant*, which means the fame thing. About the time that the organ was received in churches and convents, the Gregorian chant, or plain-fong, began to be organized by voices, in the manner which was afterwards called difcant, and the fimultaneous correfpondence of that harmonical feries which conftitutes concert, or mufic in different parts, has been varioufly expreffed by writers on the fubject, fince it was firft fuggefted. The moft ancient names given to it by Hubald, Odo, and Guido, are diaphonia, and organum; and difcantus, triplum, quadruplum, diateffaronare, quintoier, motetus, medius, and tenore, are all words that preceded the term counterpoint. As thofe implied finging upon a plain fong, extempore; and contrapunctum, written harmony.

The moft ancient authority which Du Cange gives for the ufe of the word difcantus, difcantare, is from Hugotio of Vercelli, bifhop of Ferrara, and the firft definer of decretals, who died 1212. This author fays, "decantare eft valde cantare, difcantare et excantare, id eft, difcantare." It is called by Guido, in his Micrologus, organum, and organizare, according to Du Cange, is canere in modum organi; and among his authorities, he gives the following definition from the catholicon, or lexicon, of John de Janua, written in 1286; "Organizare organo cantare; jouer ou chanter en orgres, organifor, to play or fing like the organ."

The fubject of the fifth chapter of Franco's tract in the Bodleian library, Oxon, in difcant, and the agreement of different voices. Difcant, in the infancy of what was afterwards called counterpoint, and, in old Englifh, faburden, implied a double chant or melody.

There are feveral curious particulars concerning difcant in the writings of the celebrated Gerfon, chancellor of the church and univerfity of Paris at the beginning of the 15th century.

century. According to him, the ground-work of all difcant was the plain chant; and, in his treatife of the education of children for the choir of Notre Dame, he enjoins a particular attention to chanting, counterpoint, and difcant, as the three moft effential branches of their ftudy.

Difcant, by the Italians, is called contrappunto alla mente, or extemporaneous harmony. Padre Martini, "faggio di contrappunto," heard this kind of harmony, a quattro voci, in four parts, produced in great perfection in the church of St. John Lateran, in Rome, 1747. It is called by the French "Chant fur le livre." To compofe a part upon feeing only the chant upon which it is to be built is very difficult, and requires, fays Rouffeau, great knowledge, habit, and quicknefs of ear in thofe who practife it; and the more fo, as the key is not always fo eafily found as in modern mufic. However, there are muficians in the church fo well verfed in this kind of finging, that they lead off, and even carry on, fugues extempore, when the fubject will allow it, without confounding or encroaching upon the other parts, or committing a fingle fault in the harmony.

DISCEIT, in our *Old Writers*. See Deceit and Deceptione.

DISCERI, in *Ancient Geography*, a people inhabiting the interior of Africa, faid by Pliny to have been fubdued by Cornelius Balbus.

DISCERNING, an act of the mind, whereby it diftinguifhes between ideas.

On this faculty of difcerning depend the evidence and certainty of feveral, even general propofitions, which pafs for innate truths; and which in reality flow from this clear difcerning faculty of the mind, whereby it perceives two ideas to be the fame, or to be different.

In being able nicely to diftinguifh one thing from another, where there is the leaft difference, confift in great meafure that exactnefs of judgment, and clearnefs of reafon, which are to be obferved in one man above another; which are quite oppofite to wit: this confifts moft in the affemblage of ideas, and putting thofe together with quicknefs and variety, which have the leaft refemblance to form agreeable vifions: whereas judgment feparates carefully thofe ideas, wherein can be found the leaft difference, to prevent error and delufion. To the well diftinguifhing of our ideas it chiefly contributes, that they be clear and determinate; and when they are fo, there will not arife any confufion, or miftake about them, though the fenfes fhould convey them from the fame object differently on different ccafions. See Judgment.

DISCEUS, or Disciformis *Cometa*. See Discus.

DISCHARGE, in *Electricity*. See Charge.

Discharge, in *Law*, on writs and procefs, &c. is, where a man is confined by fome legal writ or authority, and doth that which by law he is required to do, he is releafed or *difcharged* from the matter for which he was confined. If one be arrefted by a *latitat* out of B. R., and the plaintiff do not file a declaration againft the defendant in prifon in two terms, he fhall be difcharged on common bail. (1 Lil. Abr. 470.) Alfo where a defendant on arreft is admitted to bail, if the bail bring in the principal before the return of the fecond *fcire facias*, iffued out againft them, they fhall be difcharged. If an obligee difcharges one joint obligor when feveral are jointly bound, it difcharges the others. (Merch. 129.) And a man may difcharge a promife made to himfelf, &c. (Cro. Jac. 483.) See Acquittal, Charge, Habeas Corpus, &c.

Discharge, in *Military Language*, is the difmiffion of a foldier from the troop or company to which he belonged, either by his own requeft, or when after long and faithful fervice, he is entitled to his majefty's bounty. See Dismiss.

Discharge, *To*, in *Sea Language*, fignifies to unload a fhip, or take out her ftores, ammunition, artillery, &c. When applied to the crew, it implies to difband them from immediate fervice.

Discharge *of Fluids* through apertures, orifices, &c. The various important particulars which demand attentive confideration relative to the difcharge of fluids through apertures made in the fides of veffels in which thofe fluids are contained; are the quantity of fluid difcharged in a given time through a given aperture; the form, direction, impetus, and velocity of the ftream; and the forms of apertures, pipes, &c. the moft advantageous for anfwering particular purpofes. The obvious extent and importance of the fubject have induced the greateft philofophers and mathematicians of the laft century or two, to exert themfelves in the inveftigation of the above-mentioned particulars; and if our prefent knowledge of the fubject has not as yet attained its ultimate degree of perfection; it muft, however, be acknowledged, that the mathematical theory of hydraulics, affifted by the known refults of practical inveftigations or experiments, is now capable of foretelling the refult of any particular new conftruction, in fome cafes *exactly*, and in moft others fo very near the truth, as to differ from it by at moft one-fifth of the whole. In this fubject, the determinations of the theoretical propofitions do not in general agree with the refults of actual experiments; not on account of any defective demonftration, but becaufe the demonftrations cannot be eftablifhed upon all the concurring circumftances; fome of which are of a fluctuating nature, whilft the extent of others is either not known or cannot be duly appreciated. Thofe circumftances are the peculiar qualities of fluids, which vary according to homogeneity, purity, temperature, &c; the attraction of aggregation, or corpufcular attraction, which differs confiderably in water, oil, mercury, &c; the friction againft the fides of the veffels; the refiftance of the air; the fize of the veffel in proportion to the aperture through which the fluid iffues; the fhape of the aperture; the different directions in which the various parts, or (as they are otherwife called) the various *filaments*, of the fluid are obliged to run towards the aperture; and the vortices or irregular motions, that are communicated to the fluid by a variety of caufes; even by an obftacle prefented to the ftream at fome diftance from the aperture. However, it muft be acknowledged, that the conftant attention which is paid to the refults of experiments renders the theory daily more extended and more precife.

For the fake of perfpicuity, we fhall feparate the theoretical propofitions from the experimental part; but confidering the intricacy, and at the fame time, the infufficiency of the theory, we fhall only ftate the leading theoretical propofitions; referring at the fame time the inquifitive reader to other works written exprefsly on the fubject; and fhall then add, in a more extenfive manner, an account of the moft ufeful experimental inveftigations, whence the reader may be enabled to adopt the moft ufeful practical deductions, without his being perplexed by intricate, and in moft cafes infufficient calculations.

Propofition I. When water, or other non-elaftic fluid, runs through a pipe or tube of an uniform fhape; equal quantities of it pafs through every parallel fection of the tube; *viz.* the water runs with equal velocity through every one of thofe fections.

This is fo very evident, confidering that the fame quantity of fluid muft pafs through the fame fection in the fame time, as to require no farther illuftration; but it muft be obferved,

obferved, that though the water runs with the fame velocity through every fection of the tube, yet it does not run with equal velocity through every part of the fame fection. Its motion is fwifter towards the middle, and flower towards the fides of the tube, where it is retarded by the friction againft the fides.

Propofition II. When water, or other non-elaftic fluid, runs through a pipe or tube, which is kept continually full by means of a proper fupply; but which is not of an uniform fhape; then the velocities of the fluid in different fections will be inverfely as the areas of the fections.

Since the tube is always full, the fame quantity of water muft pafs through every fection of it in the fame time; but if the area of one fection be half as great as the area of another fection, the fame quantity of water cannot pafs through both fections at the fame time, unlefs it paffes through the former fection with double the velocity with which it paffes through the latter. If the area of the former fection be one-third or one-fifth, of the area of the latter, the fame quantity of water muft pafs through the former with a velocity which is three times or five times the velocity with which it paffes through the latter. Hence, in general, the velocities muft be inverfely as the areas of the fections.

Propofition III. If a fluid, as water, flowing through a very fmall orifice in the bottom of a veffel, be kept conftantly at the fame height in the veffel, by being fupplied as faft above as it runs out below, the velocity of the effluent fluid will be equal to that, which a heavy body would acquire in falling freely through the height of the fluid above the orifice.

Let M N O P, *Plate* I. *Hydraulics*, *fig.* 6, reprefent a veffel filled with a non-elaftic fluid up to the level G H; M P the bottom in which is the aperture C D (very fmall in comparifon with M P); C I K D the column of the fluid ftanding directly above the aperture, and C A B D the loweft plate of the fluid immediately contiguous to the aperture. Alfo let v denote the velocity which a heavy body would acquire in falling freely through B D, the height of the plate, and V the velocity acquired by the fame plate during its defcent through the fame fpace until it is difcharged by the preffure of the column C I K D. If we fuppofe the loweft plate of fluid A C B D to fall as a heavy body through the height B D, its moving force will be its own weight. Again, fuppofe it to be accelerated by its own weight, together with the preffure of the ambient fluid, about the column C I K D; *viz.* by the weight of the column C I K D, through the fame fpace; that is, while it is accelerated from quiefcence until it is actually difcharged: then (agreeably to the eftablifhed laws of dynamics) the velocity in the former cafe will be to that in the latter, as the moving forces and the times in which they act directly, and the quantities of matter moved inverfely. See Dynamics. But the moving forces are to each other as the heights B D and K D; the times in which they act are inverfely as the velocities, the fpace through which the body is accelerated, being given; and the quantities of matter moved are equal: therefore, $v : V :: \frac{BD}{v} : \frac{KD}{V}$; whence $v^2 : V^2 :: BD : KD$; or $v : V :: \sqrt{BD} : \sqrt{KD}$. Now v is the velocity which a heavy body would actually acquire in falling through the fpace B D; confequently V the velocity of the effluent fluid is that which a heavy body would acquire in falling through K D, the whole altitude of the fluid above the orifice.

Corollaries.

1. In the fame manner it may be fhewn, that if a pipe be inferted horizontally in the veffel M N O P, *fig.* 7, the plate of fluid A C B D will be difcharged with the fame velocity as before (if its centre of preffure be of the fame depth), whatever be the thicknefs of the plate; this velocity not depending upon a continual acceleration through the length of the tube, otherwife the effluent fluid could not attain its full velocity, until a column had been difcharged whofe bafe is equal to the orifice, and height equal to the length of the tube: whereas we find by experience, that this full velocity can be attained by the thinneft plate which can be let efcape from the aperture.

2. The velocities and quantities difcharged at different depths, are as the fquare roots of the depths.

3. The quantity run out in any time is equal to a cylinder, or prifm, whofe bafe is the area of the orifice, and its altitude the fpace defcribed in that time by the velocity acquired by falling through the height of the fluid.

So that if h denote the height of the fluid,

a, the area of the aperture,

g, $32\frac{1}{6}$ feet, or 386 inches, and

t, the time of efflux; we fhall have for the quantity difcharged, $Q = at\sqrt{2gh}$;

Or, when a and h are expreffed in feet, $Q = 8.0208\, at\sqrt{h}$, feet.

When a and h are expreffed in inches, $Q = 27.7387\, at\sqrt{h}$, inch.

If the orifice is a circle whofe diameter is d, then $0.785398\, d^2$ muft be fubftituted for a;

And when d and h are expreffed in feet, $Q = 6.29952\, d\sqrt{h}$, feet.

When d and h are expreffed in inches, $Q = 21.78592\, dt^2\sqrt{h}$, inches.

And from either of thefe it will be eafy to find either a, t, or h, when the other three quantities are given.

4. The force with which the effluent water impinges againft any quiefcent body, is proportional to the altitude of the fluid above the orifice. For the force is as the velocity multiplied by the quantity of matter; but the quantity difcharged in a given time is as the velocity; therefore the force is as the fquare of the velocity; that is, by the demonftration of the propofition, as the height of the fluid.

5. The water fpouts out with the fame velocity whether it be downwards, or upwards, or fideways; becaufe the preffure of fluids is the fame in all directions at the fame depth.

6. Hence, if the *adjutage* (*viz.* the laft appendage or termination affixed to the aperture) be turned upwards, the jet will afcend to the height of the furface of the water in the veffel. In practice, however, the jet is found to be fhorter than the height of the fluid in the refervoir; which is owing to the friction of the fluid againft the fides of the aperture, and againft the furrounding air. The difference between the height of the jet and that of the fluid in the veffel or refervoir, will be fhewn under the article Jet.

It is now neceffary to obferve the fame thing that has been already obferved in propofition I. *viz.* that the velocities of the effluent water, as mentioned in this propofition and its corollaries, muft be underftood of thofe filaments only of the fluid which pafs through the centre of the aperture, which are fuppofed to fuffer no retardation; for thofe filaments which pafs by the fides of the aperture are confiderably retarded by the friction againft thofe fides, and other circumftances, in confequence of which they produce a remarkable configuration of the ftream, which will be defcribed hereafter.

Propofition IV. When a veffel is left to difcharge itfelf gradually through an orifice in its bottom, if the area of the fection

fection parallel to the bottom be every where the fame, the velocity of the furface of the fluid, and, confequently, the velocity of the efflux, will be uniformly retarded.

For (by Prop. II.) the velocity of the defcending furface is to the velocity at the furface, as the area of the orifice to the area of the furface, which is a conftant ratio; confequently, the velocity of the defcending furface varies as the velocity at the orifice, or as the fquare root of h; that is, the velocity of the defcending furface varies as the fquare root of the fpace which it has to defcribe: fo that this exactly correfponds with the cafe of a body projected perpendicularly upwards, where the velocity is as the fquare root of the fpace to be defcribed: whence, as the retarding force is conftant in the inftance referred to, it muft alfo be conftant in the cafe before us, and the retardation uniform. From this comparifon we deduce the following obvious corollaries.

1. The quantities of water in a prifmatic veffel difcharged through an aperture in the bottom, decreafe in equal times as the feries of odd numbers 1, 3, 5, 7, 9, &c. taken in an inverted order.

2. The quantity of water contained in an upright prifmatic veffel is half that which would be difcharged in the time of the entire gradual evacuation of the veffel, if the water be kept always at the fame altitude.

Whoever wifhes to examine the theoretical part of the prefent fubject more at large, may confult the following works. S'Gravefande, Nat. Phil. Jo. Bernouilli on the motion of water in pipes, C. Peter. IX. X. Euler on the motion of water in pipes, A. Ber. 1752. Alfo his Principles of Hydraulics, ibid. 1755. On the re-action of water in pipes, N. C. Peter. VI. Raccolta di autori che trattano del moto delle acque, Flor. 1725, which contains the inveftigations of Archimedes, Albici, Galileo, Caftelli, Michelini, Borelli, Montanari, Viviani, Caffini, Guglielmi, Grandi, Manfredi, Picard, and Nanducci. Borda on the difcharge of fluids. A. P. 1766. Lagrange on the motion of fluids, A. Berl. 1781. M. Young on fpouting fluids, Irifh Tranf. 1788. Prony Archit. Hydraulique. Lorgna on fpouting fluids, Soc. Ital. IV. Venturi fur la communication laterale de mouvement dans les fluides. Par. 1798. Young on the difcharge of a vertical pipe. Journ. R. J. Boffut's Hydrodyn. Gregory's Mechanics. b. 4. c. 1.

We muft now proceed to treat of the experimental part of the prefent fubject; and with refpect to this we fhall only advert to the more important experiments and the moft ufeful refults.

The ftream of water which iffues out of a hole tends to carry away in its direction any other fluid, or any other body fufficiently light, which may happen to be near it. This is what profeffor Venturi calls *the lateral communication of motion in fluids*. But by this lateral communication of motion to contiguous bodies, the celerity of the fluid itfelf is checked more or lefs, and its courfe is partly diverted from that direction which it would otherwife follow. Thus, in *fig.* 8, which reprefents the upper furface of two veffels contiguous to each other, and full of water, as high as the hole or aperture A. If by pouring more water into the veffel B, a ftream of water be caufed to flow through A, into the veffel C, this ftream will carry away the water from the parts *ee*, towards C. But the depreffion, or deficiency, of water at *ee*, is replaced by the water from the adjacent parts *dd*, which are replenifhed from the next, and fo on. This produces eddies at *ed*, *ed*. This phenomenon may be rendered more apparent by throwing a little milk into the veffel B, or by letting fmall light bodies float upon the furface of the water.

When a ftream comes out of a hole, as at A, *fig.* 9, if a thread, a feather, or other light body be placed very near it, the tendency of the ftream to carry it towards B may be clearly perceived. This tendency is ftill more evidently fhewn by the following experiment.

Let a veffel, open at top, be made of the form of the lateral reprefentation A D B, *fig.* 10, having one flant fide. Let a cylindrical pipe, of about half an inch in diameter, and upwards of a foot in length, proceeding from a veffel C, come ftraight down into the veffel A D B, and there let its termination F S be bent in the direction of the flant fide B D. This done, fill the veffel A D B with water, then pour water into the veffel C, fo that the water running down the pipe E F S, may form the jet S K. It will be found that the water of the veffel A D B is carried away by the ftream S K, and this veffel is thereby almoft entirely emptied.

To an aperture on the fide of the veffel A B, *fig.* 11, a pipe 1.6 inch in diameter, and little more than five inches in length, was adapted in an horizontal direction by profeffor Venturi. At E, diftant 0.71 inch from the fide of the veffel, a bent glafs tube, E F G, was joined, whofe cavity was opened into that of the pipe, whilft its other extremity was immerfed in coloured water, which was contained in a fmall veffel G.

When, by pouring water into the veffel A B, a ftream was made to flow out at D, the coloured water was feen to rife confiderably in the lower leg of the glafs tube. The experiment being repeated when the defcending leg F G of the glafs tube was only 6.4 inches longer than the part E F; the coloured water of the veffel G rofe through the glafs tube, and mixing with the other water, flowed with it out of the pipe at D; and in a fhort time the veffel G was emptied.

This lateral communication of motion takes place whether the difcharging pipe is directed horizontally, or upwards or downwards, or, in fhort, in every direction, but it is more powerful when the ftream is directed downwards, which is owing to the tendency that a defcending ftream has of dividing itfelf in confequence of the acceleration of falling bodies; for that part of the ftream which is juft out of the aperture moves with lefs velocity than that which is farther off. When water runs out of an aperture in the thin fide or bottom of a veffel, as at A *fig.* 9, the fize of the aperture being very fmall in proportion to the fide or bottom of the veffel; the ftream A B is not throughout of the fhape of the aperture, nor is it of an uniform fize. When the aperture is circular, the diftance of the narroweft part of the ftream, from the infide furface of the veffel, is about equal to the diameter of the aperture. This narroweft part of the ftream has been called the contracted vein (*vena contracta* by Newton, who firft took particular notice of it) from which place forwards the ftream grows larger, and fometimes divides itfelf into different parcels.

The diameter of the contracted vein, or of the narroweft part of the ftream, has been differently eftimated by different obfervers: and probably the difference has been occafioned by fome unadverted variation in the fize of the veffel, thicknefs of the fide in which the aperture was made, &c.—Newton found that at the diftance of about a diameter of the orifice the fection of the contracted vein was nearly in the fubduplicate ratio of 2 to 1. Polenus makes the ratio of the diameters of the contraction and of the aperture to be as 11 to 13; Bernouilli, as 5 to 7; Du Buat, as 6 to 9; Boffut, as 41 to 50; Eytehvein, as 16 to 25; Michelotti, as 4 to 5. Venturi nearly as 4 to 5. Venturi alfo obferves that the contraction of the ftream takes place at a greater diftance under

under ſtrong charges than in thoſe which have but little elevation. Michelotti alſo found that the ſtream was a little more contracted as the velocity was greater.

This contraction of the ſtream is undoubtedly owing to the various directions in which the fluid comes along the ſides and from every part of the veſſel, towards the aperture; and, in fact, when the aperture is very large in proportion to the ſize of the veſſel, the contraction of the ſtream is leſs apparent. Alſo, if the aperture be not in a plate ſufficiently thin, the vena contracta will not be perceived; for ſince the diſtance of that contraction from the inner ſurface of the veſſel is about equal to the diameter of the aperture, if the thickneſs, or rather the length of the aperture, exceed its diameter, as when a pipe is added to the aperture: then the contraction, or the tendency to form the contraction, takes place within the length of the aperture or pipe.

The various filaments of the fluid, which run from every part of the veſſel in oblique directions towards the aperture, partly croſs each other at the *vena contracta*; and this croſſing, or tendency to croſs, is one of the cauſes which enlarge the ſtream beyond that place.

The velocity of the water is not the ſame in every part of the ſtream; for ſince the ſame quantity of water muſt paſs through every tranſverſe ſection of it in a given time, the velocity (by prop. II.) muſt be inverſely as the area of each ſection. Therefore at the *vena contracta* the velocity is greater than at the aperture; and, indeed, in the different caſes this reduced area of the *vena contracta* ſhould be conſidered as the real area of the orifice through which the fluid iſſues, and its vertical diſtance from the upper ſurface of the fluid in the reſervoir as the height due to the velocity of the fluid iſſuing through this contraction, which, as has been already obſerved, is ſuch as a body would acquire by falling perpendicularly from the height of the fluid in the veſſel; whereas the velocity at the aperture itſelf is ſuch as a body would acquire by falling perpendicularly from the *half* of that height.

With reſpect to the quantity of fluid diſcharged, Mr. Boſſut's experiments, which were made with peculiar accuracy, demand particular notice. They are expreſſed in the following table, which exhibits the quantity of fluid diſcharged through orifices pierced in thin plates; in meaſures of the Paris foot royal, which is to the Engliſh foot, as 1066 to 1000. Boſſut's Hydrodyn. t. ii. p. 47.

Conſtant altitude of the Water in the Reſervoir above the Aperture, in Paris Feet.	Theoretical Diſcharges in one Minute, through a circular Aperture of Tin, Diameters expreſſed in cubic Inches.	Real Diſcharges in the ſame Time, through the ſame Orifice, expreſſed alſo in cubic Inches.
1	4381	2722
2	6196	3846
3	7589	4710
4	8763	5436
5	9797	6075
6	10732	6654
7	11592	7183
8	12392	7672
9	13144	8135
10	13855	8574
11	14530	8990
12	15180	9384
13	15797	9764
14	16393	10130
15	16968	10472

The following is another ſet of experiments made by the ſame author with different apertures, in which the water was kept conſtantly at the altitude of eleven feet, eight inches, ten lines, from the centre of each aperture.

Experiments.	Cubic Inches furniſhed in one Minute.
1. With an horizontal circular aperture, 6 lines in diameter - - - -	2311.
2. With a circular horizontal aperture, 1 inch in diameter - - - . -	9281.
3. With a circular horizontal aperture, 2 inches in diameter - - -	37203.
4. With a rectangular horizontal aperture, 1 inch by 3 lines - - -	2933.
5. With a ſquare horizontal aperture, the ſide 1 inch - - - - -	11817.
6. With a ſquare horizontal aperture, the ſide 2 inches - - - - -	47361.
Conſtant height of water 9 feet.	
7. Lateral circular aperture, 6 lines in diameter	2018.
8. Lateral circular aperture, 1 inch in diameter	8135.
Conſtant height of water 4 feet.	
9. Lateral circular aperture, 6 lines in diameter	1353.
10. Lateral circular aperture, 1 inch in diameter	5436.
Conſtant height of water, 7 lines.	
11. Lateral and circular orifice, 1 inch in diameter	628.

From theſe experiments we may derive the following deductions, *viz.*

1. The quantities of fluid diſcharged in equal times from different ſized apertures, the altitude of the fluids being the ſame, are to each other nearly as the areas of the apertures.

2. The quantities of water diſcharged, in equal times, by the ſame aperture, with different altitudes of water in the reſervoir, are nearly as the ſquare roots of the correſponding altitudes of the water in the reſervoir above the centre of the aperture.

3. That, in general, the quantities of water diſcharged, in the ſame time, by different apertures, and under unequal altitudes of the water in the reſervoir, are to each other in a compound ratio of the areas of the apertures, and the ſquare roots of the altitudes.

4. That, on account of the friction, the ſmalleſt apertures diſcharge leſs water than thoſe that are larger and of a ſimilar figure, the water in the reſpective reſervoirs being at the ſame height.

5. That of ſeveral apertures whoſe areas are equal, that which has the ſmalleſt circumference will diſcharge more water than the others, the water in the reſervoirs being at the ſame altitude, and this becauſe there is leſs friction. Hence circular apertures are moſt advantageous, as they have leſs rubbing ſurface under the ſame area.

Thus far we have treated of ſimple apertures; but if to the circular aperture on the ſide of a veſſel, there be applied a cylindrical pipe of the ſame diameter, and whoſe length is equal to from two to four times that diameter, as A B, *fig.* 12, then a greater quantity of water will be diſcharged through it, than through the ſimple aperture in an equal portion of time, every other circumſtance remaining the ſame; the quantities of fluid diſcharged in theſe two caſes being as 133 to 100 nearly.

The pipe A B, or any other prolongation of any ſhape which is adapted to the aperture of a veſſel, has been called the *adjutage*, from its property of promoting the diſcharge of the fluid.

It has likewiſe been obſerved, that the diſcharge, in a given time, is the ſame, whether the aperture be furniſhed with the abovementioned cylindric pipe, or with the pipe repreſented

reprefented in *fig.* 13, which differs from the former only by its having, clofe to the fide of the veffel, a contraction nearly of the fhape of the contracted vein.

If the laft mentioned pipe be cut off at the contraction, and the firft conical part only be left affixed to the aperture, as in *fig.* 14, then the difcharge of water is rather lefs than from a fimple aperture; but it is probable, that it would be quite the fame, were it poffible to make the conical adjutage exactly of the fhape of the natural contracted vein; excepting, however, the effect of friction.

If to this conical part a cylindrical tube of the diameter of the fmall part of the conical pipe, be applied, as in *fig.* 15, the difcharge of fluid will thereby be diminifhed, and more fo according as the length of the cylindrical part is increafed.

If to the fmall conical part of the adjutage, *fig.* 14, a diverging pipe, *viz.* another conical tube be applied, as in *fig.* 16, the difcharge of water will thereby be increafed within a certain limit; for it appears that when the divergency is greater than 16 degrees, the effect ceafes entirely, and that the greateft difcharge takes place, when the divergency is equal to an angle of about three degrees. And if between thofe two conical parts a cylindrical tube be interpofed, as in *fig.* 17, then the difcharge is again diminifhed, but not nearly fo much as if the outer conical part were removed. It appears from the obfervations of Venturi, that with any length of intermediate pipe, the difcharge is always promoted by the abovementioned conical termination, which would be of infinite practical ufe; for the difcharge might be promoted without the enlargement of the pipe; and in moft cafes fo it actually proves to be; but Mr. Eytelwein obferves, that if the pipe, or tube, be very long, the advantage produced by the abovementioned conical termination, becomes infenfible or nearly fo. Profeffor Venturi, in order to determine the precife quantity of the effect, which each of the abovementioned conformations of difcharging pipes produced, inftituted an accurate fet of experiments, which we fhall concifely fubjoin as being of confiderable importance in practical hydraulics.

The fame quantity of water, (*viz.* 4845 Englifh cubic feet) flowed out of the fame veffel or refervoir, which was kept conftantly full, through the following adjutages, in the annexed times, which are expreffed in feconds. The altitude of the water in the veffels, above the level of the centre of the outer aperture of the adjutage, was always equal to 34,642 Englifh inches.

Through a fimple circular aperture in a thin plate, the diameter of the aperture being equal to 1.6 inches, in - - - - - - 41″

Through a cylindrical tube of the fame diameter as above, and 4 8 inches long, as in *fig.* 12, in - - 31″

Through the tube, *fig.* 13, which differs from the preceding, by having the contraction in the fhape of the natural contracted vein, in - - - - 31″

Through the fhort conical adjutage, *fig.* 14, which is only the firft conical part of the preceding, in - 42″

Through the pipe, *fig.* 15, which confifts of a cylindrical tube, adapted to the fmall conical end of *fig.* 14, and of the fame diameter; A D being 3.2 inches long, in - - - - - - 42″.5

Through the like adjutage, but longer, A D being 12.8 inches long, in - - - - - - 45″

Through the like, ftill longer, A D being 25.6 inches, in - - - - - - - - - - 48″

Through an adjutage confifting of the fimple tube of *fig.* 12, placed over the conical part of *fig.* 14, in - 32.″5

Through the double cone, *fig.* 16, the dimenfions of which are, A B = E F = 1.6 inches, A C = 0.977 inches, C D = 1.376 inches, and the length of the outer cone = 4.351 inches, in - - 27″.5

Through the adjutage, *fig.* 17, confifting of a cylindrical tube 3.2 inches long, and 1.376 inches in diameter, interpofed between the two conical parts of the preceding, in - - - - - - 28″.5

The effect of the above-mentioned adjutages is the fame, whether they be adapted to the fide, or to the bottom of the veffel, or in any other direction, (fince fluids prefs equally in every direction at the fame depth) provided every other circumftance be the fame; fuch as the capacity and form of the refervoir, the altitude of the water above the level of the centre of the outer aperture of the adjutage, &c.

All flexures, and all forts of internal contractions, enlargements, elongations, finuofities, and projections, in the conducting pipe, diminifh more or lefs the quantity of difcharge. The caufe of this retardation, or diminution of the difcharge, is undoubtedly owing to the eddies, and to the croffings of the various filaments of the fluid, which, according to what has been obferved above, muft neceffarily take place at thofe irregularities. This may be rendered fufficiently evident, if an irregular glafs pipe be applied to a pretty large veffel full of water, in which fome light bodies, as fome powdered amber, be mixed; for amber being nearly of the fame fpecific gravity as water, by the motion of its particles it will clearly fhew the various and irregular directions of the water within the tube.

All eddies and crofs directions muft unavoidably tend to deftroy part of the moving force. The difcharges out of a ftraight tube, a curved tube in a quadrantal arc, and an elbowed tube forming a right angle (when they are all fituated horizontally and in fimilar circumftances) are nearly as 70, 50, and 45; whence it appears, that fharp angular bendings hinder the paffage of the fluid confiderably more than thofe of a regular curvature. The internal roughnefs of a pipe contributes likewife to diminifh the difcharge. Whenever an irregularity in the fhape of the aperture, or fome particular conformation of the veffel, compels the particles of the fluid to run obliquely towards the aperture, a circular motion is thereby foon communicated to the fluid, and an hollow whirl is formed in the veffel above the aperture. In confequence of that circular motion, the particles of the fluid acquire a centrifugal force, which compels them to recede from the centre, or from the axis of motion, where of courfe a hollow is formed, which is larger or fmaller, according as the rotatory motion of the fluid is more or lefs rapid. When this whirling motion is pretty confiderable, if any light bodies, floating upon the water, happen to come within the whirl, they will be readily drawn downwards towards the aperture; for, fince the fpecific gravity of the fluid is greater than that of the bodies, the fluid will acquire a greater degree of centrifugal force, and will recede farther than thofe bodies from the axis of the whirl.

We might now proceed to defcribe the form and altitude of the ftream of fluid, when its direction is either oblique, or perpendicularly upwards or downwards; but thefe particulars more properly belong to the articles JET and STREAM, which fee. It is alfo neceffary to obferve, that in the courfe of the above-defcribed experiments, remarks, &c. we have taken no notice of any other fluid befides water; the reafon of which is, firft, that as water is the moft general fluid, with whofe action human affairs are naturally and artificially concerned, moft of the experiments and inveftigations have been made relatively to that fluid; and, fecondly, when any ufeful refults have been either theoretically or practically eftablifhed with refpect to water, the application of the fame

 refults

refults to other non-elaftic fluids may be eafily made, by allowing for the peculiar fpecific gravities, adhefive qualities, and other peculiar properties of thofe other fluids.

Having thus far treated of the difcharges of non-elaftic fluids through apertures, &c. a fimilar inveftigation ought to follow with refpect to the difcharge, or tranfition, of aerial (*viz.* elaftic) fluids through apertures, &c. Of this, however, we fhall only fubjoin a few of the more general particulars, without any theoretical demonftration, or practical illuftration; for, as thofe tranfitions or difcharges of elaftic fluid, are entirely dependent upon that property by which they are diftinguifhed from water and other non-elaftic fluids, they are much better explained, and much more eafily underftood, in conjunction with the explanation of that characteriftic property, for which fee the article Pneumatics, wherein the demonftrations, together with practical remarks, refpecting the following and other particulars, will be found. Air rufhes from the atmofphere into a vacuum, or into a veffel exhaufted of air, with the velocity which a heavy body would acquire by falling from the top of an homogeneous atmofphere; which height may be reckoned equal to 27818 feet.

Put D for the natural denfity of the air in the atmofphere; δ the denfity of the air contained in a veffel partly exhaufted; V for the velocity of air of the denfity D rufhing into a void, and v for the velocity with which it will rufh into the rarefied air of the denfity δ; then $v = V \times \sqrt{1 - \frac{\delta}{D}}$ is an expreffion for the velocity with which the air of the atmofphere will rufh into a fpace containing rarer air.

The difcharge of elaftic fluids through different apertures, or their paffage through pipes of various fhapes, lengths, curvatures, &c. is likewife varioufly affected by thefe circumftances. It alfo differs according to the peculiar nature of the elaftic fluid employed.

Discharge *of charged electrics.* See the articles Electricity and Leyden Phial.

DISCHARGED Work, in *Calico-Printing.* See Paste-Work.

DISCHARGER, in *Electricity,* is an inftrument which, being interpofed between the two coatings, or the two charged furfaces of a Leyden phial, electric jar, battery, &c. will enable the operator to difcharge that jar, or battery, &c. without any danger to himfelf. For this purpofe various inftruments have been contrived; but the moft effentially ufeful are of three fpecies, the fimpleft of which has received the denomination of *fimple difcharger*, or *difcharging rod;* the next has been called the *difcharging electrometer*; and the third has been called the *univerfal difcharger,* from its being capable of anfwering all the principal objects which may be defired in difcharging charged electrics. We fhall now defcribe thofe inftruments in the order of their fimplicity.

The *Simple Difcharger*, or *Difcharging Rod,* is a metallic wire, about the fize of a quill, fometimes ftraight, but more commonly bent, as in *Plate* III. *Electricity, fig.* 10, and generally having a metallic ball or knobbed termination at each end C, B. When a charged jar or battery is to be difcharged, the operator holding the difcharging rod by its middle A, firft applies one end of it to the outfide coating of the jar, and then brings the other extremity of the rod in contact with the infide coating, or with the wire, or knobbed wire, which communicates with the infide coating of the jar, by which means the electric power will be conveyed from one fide of the charged electric to the other, and thus the difcharge is effected. With fuch a difcharging-rod, however, and when the jar or battery is very powerful, the operator is not quite fafe; for, in the firft place, he will feel fome effect of the fhock, in confequence of what is called, in electricity, the *lateral fhock;* and fecondly, if he happens to touch, with any part of his body, any metallic communication to one fide of the jar, he may run the rifque of having the whole fhock through his body. In confequence of this inconvenience, an infulating handle has been added to the preceding difcharging rod, as is fhewn in *fig.* 11, where A B is a glafs handle, having a brafs ferrule, B C, cemented upon its extremity, and the rod paffes through a hole in the brafs ferrule at C. In ufing this difcharging rod, the operator holds it by applying his hand at A, in which cafe he becomes perfectly feparated from the circuit of the difcharge.

The principal defect of the preceding difcharging rods is, that they cannot be conveniently adapted to electrics of various fizes and various fhapes; but this defect is entirely removed by the conftruction reprefented in *fig.* 12, which confifts of a glafs handle A, and two curved wires B, B, which are moveable, like a pair of compaffes, by the joint C, which is fixed to the brafs cap of the handle A. The wires B, B, are pointed, and their pointed terminations enter the balls D, D, to which they are fcrewed, and from which they may be unfcrewed at pleafure. The advantages of this conftruction are, that the operator has the opportunity of ufing either the knobbed, or the pointed terminations, according as the experiments may require. And as the wires are moveable, fo that the extremities D, D, may be placed nearer to, or farther from, each other, the difcharging rod may be adapted to fmall as well as to large jars, or to a coated plate of glafs, or, in fhort, to all forts of charged electrics. Mr. Nairne contrived a difcharger, which he ufed to put up in the boxes with his patent electrical machines, and to which he gave the name of the *luminous infulated difcharging rod.* It confifts of an arched glafs tube A B, *fig.* 13. to the extremities of which two brafs balls are cemented, and the communication from one brafs ball to the other is formed by an iron chain which paffes through the tube and almoft fills the whole cavity of it. The glafs tube paffes through a hole in the wooden termination C of the handle. It is evident that fuch a difcharging rod cannot be adapted to jars of different fizes. In making the difcharge of a jar with it in a dark room, and even in the day light, luminous fparks are feen between the links of the chain within the tube, in confequence of which this difcharging rod has obtained the epithet of *luminous.*

The *Difcharging Electrometer* was originally contrived by Mr. Lane (fee the Phil. Tranf. for 1767), and its ufe is to enable an electrified conductor, or a charged electric, to difcharge itfelf, when the intenfity of the electricity in it, or the height of the charge, has reached a certain particular degree, which degree the operator may vary at pleafure. Since Mr. Lane's original invention, this inftrument has undergone various alterations in the hands of different electricians; but the principle remains the fame. *Fig.* 14, reprefents this inftrument, A B C is all of brafs, *viz.* a brafs wire having two brafs balls A and B. To a hole in the brafs ball B the extremity of the bent glafs arm, (which is a folid ftick of glafs,) is firmly cemented. To the extremity of the vertical part of this arm, a brafs ball F, having a proper ferrule, is cemented. E G is a brafs fcrew that has a brafs ball at E, and a milled head at G. The female of this fcrew is in the ball F, fo that by turning the milled head G, the wire G E may be fcrewed in or out, and, of courfe, the ball E may be fituated within any required diftance of the ball A. A divided fcale D H is faftened to the ferrule of the brafs ball F, and it contains the divifions of inches and tenths

tenths of inches, fo difpofed, as to indicate the precife diftance between the furfaces of the balls A and E, when the edge of the milled head is againft any of thofe divifions.

Now fuppofe, that the wire C is fixed into a Leyden phial, or is connected with the infide coatings of a battery, that the balls A and E are fet at the diftance of one inch from each other, and that a metallic wire, or chain, or other conducting communication, is formed between the outfide of the phial or battery, and the part F G of the difcharging electrometer. Then let the electrical machine which charges the jar or battery be put in action, and it is evident, that when the charge is become fo high as to be able to leap through the interval of one inch, *viz.* from the ball A to the ball E, the difcharge will be made without the application of any difcharging rod or any farther interference of the operator. Thus by leaving the apparatus undifturbed, and continuing the motion of the electrical machine, fhocks precifely of the fame ftrength may be fent through a human being or through any other fubftance, that may be interpofed between the outfide coating of the jar or battery, and the part F G of the difcharging electrometer.

If the wire C is fixed in a hole on the prime conductor of an electrical machine, and a communication be made between the part F G and the ground; then, on working the electrical machine, fparks of the fame ftrength may be repeatedly obtained from the prime conductor. This equality of fhocks or fparks is of great ufe in a variety of experiments; but is particularly fo in medical electricity.

In fhort with the above Mr. Lane's electrometer, the magnitude of the difcharge is indicated by the quantity of air through which it is forced to pafs between the two balls A, E, the diftance of which may be varied at pleafure. The power of an electrical machine may be eftimated by the frequency of the fparks which pafs at any given diftance. Mr. Lane found that the quantity of electricity required for a difcharge is fimply as the diftance of the furfaces of the balls A, E; the fhocks being twice as frequent when this diftance is only $\frac{1}{24}$th of an inch as when it is $\frac{1}{12}$th.

Mr. Nairne fimplified this electrometer in the manner exhibited in *fig.* 15, which confifts of a crooked glafs arm, having a wooden termination at each end: the termination at A is conical, and fits a hole in the prime conductor of the electrical machine. The dotted circle in the figure reprefents the conductor end-ways. Through the other wooden termination, B, of the electrometer, a wire paffes, which has a brafs ball at each end: this wire may be moved backwards and forwards in a hole through the wooden end B, and thus the inner brafs ball may be fet at any required diftance from the prime conductor. The farther management of this electrometer is the fame as the preceding.

Another fort of difcharging electrometer is reprefented in *fig.* 16, where B C is a wire knobbed at each extremity, and moveable, like the beam of a balance, upon the pillar P. A is another brafs ball fixed upon another pillar, and a third pillar, which is capable of adjuftment, up or down, is at Q, and upon this pillar, which holds a little ftage, the fubftance through which a fhock is required to be paffed, muft be fituated between the extremities of two wires, one of which has a knob D. Now, when the communication is made between the infide coating of the Leyden phial and the ball A, alfo between the outfide of the phial and the wire S; then, on charging the jar, at a certain period of the charge, the repulfion which takes place between the balls A and B, will elevate B, and, of courfe, deprefs C, fo as to bring this near D, and effect the difcharge.

Other forts of difcharging electrometers may alfo be feen in the Philofophical Magazine, vol. xi. Cuthbertfon's Electricity, &c.

The *Univerfal Difcharger* was invented by Mr. Henly, and is reprefented in *fig.* 17. It confifts of the following parts. A is a flat board, fifteen inches long, four inches broad, and one thick, or nearly of thefe dimenfions. This board forms the bafe of the inftrument. B, B, are two glafs pillars, cemented in two holes upon the board A, and furnifhed at their tops with brafs caps, each of which has a turning joint, and fupports a fpring tube, through which the wire D C flides: each of thefe caps is compofed of three pieces of brafs, connected fo, that the wire D C, befides its fliding through the focket, has two other motions; *viz.* an horizontal and a vertical one. Each of the wires D C, D C, is furnifhed with an open ring at one end, and at the other end has a brafs ball D, which, by a fhort fpring focket, is flipt upon its pointed extremity, and may be removed from it at pleafure. E is a ftrong circular piece of wood, five inches in diameter, having, on its furface, a flip of ivory inlaid, and furnifhed with a ftrong cylindrical foot, which fits the cavity of the focket F, which is faftened into the middle of the bottom board, and has a fcrew G, which ferves to faften the foot of the circular board E at any required height. H is a fmall prefs belonging to this inftrument; it confifts of two oblong pieces of board, which may be preffed againft each other by means of two fcrews *a*, *a*: the lower of thefe boards has a cylindrical foot equal to the foot of the circular board E. When this prefs is to be ufed (and its ufe is to hold any thing through which a fhock is to be paffed), it is fixed into the focket F, inftead of the circular board E, which muft, in that cafe, be removed.

From what has been faid above, refpecting the other difchargers, it will be eafily underftood, that this univerfal difcharger may be adapted to anfwer every purpofe, by connecting the ends C, C, of the wires with the fides of the Leyden phial, and putting the fubftance through which the fhock is to be paffed between the brafs balls D, D, upon the board E, or between the boards of the prefs H. The balls D, D, may be unfcrewed, and the pointed extremities of the wires may be uncovered, which is of ufe in certain experiments.

DISCHARGING of Colour, is frequently employed by dyers, to produce particular patterns upon the dyed ftuffs. A manufacture of this kind has lately been introduced and profecuted to great extent in the weft of Scotland, for the purpofe of manufacturing Bandana handkerchiefs, in imitation of thofe imported from India. The material of which the fabric confifts is cotton, and the cloth is fometimes tweeled, and fometimes woven plain. The ground of the handkerchief is generally of the faft dye, commonly known by the appellation of Turkey red, and this colour being afterwards difcharged in particular places, a number of white fpots are interfperfed upon the red ground. The procefs is by no means complex, but as the manufacture is recent, has hitherto been chiefly, if not entirely, confined to the diftrict where it originated, and has been much admired; an account of the engine employed, and of the procefs, may perhaps deferve fome attention. In the Indian Bandanas, the white fpots are generally placed in clufters in the diagonal or diamond direction, and this diftribution has been moft frequently adhered to in the imitation handkerchiefs. The fpots are fometimes round, fometimes fquare, and fometimes, though more rarely, triangular. Previous to the difcovery and introduction of the difcharging procefs, as applied to this manufacture, many imitations of the Bandanas had been made by the common mode of calico-printing. But the colours of the printed handkerchiefs,

handkerchiefs, befides being lefs brilliant at firft, were found to fade fo foon, that the difcharged ones do already, in a great meafure, and will probably very foon entirely, fuperfede them.

The engine employed is a very ftrong prefs, the whole framing of which is generally of caft iron. In conftructing this prefs, it is abfolutely neceffary that every part fhould be fo ftrong, as to bear a very great preffure without yielding in any part. A ground plan, and tranfverfe elevated fection of it, are given in *figs.* 3. and 4. *Plate* VIII. *Mifcellany.*

The pattern to be formed is cut upon two flat plates, which exactly correfpond. They are ufually of caft iron, and the lower plate is faced with copper, or fome metal which will both receive a fine polifh, and refift, to a great degree, the corrofive power of the difcharging liquor, which is compofed of a preparation of the oxy-muriate of lime diluted with water. In the under plate, which muft be perfectly fmooth and level, a hole is cut for every fpot which is to be difcharged. In the upper plate, or cover of the prefs, every fpot is formed by a hollow tube of brafs or copper, which is tightly driven into a hole formed in the plate, and cemented with a compofition of white lead and oil, or any other cement, which will prevent the difcharging liquor from efcaping by any other paffage than thofe through the perforated tubes.

In the ground plan (*fig.* 3.), little more of the prefs will be feen than the upper furface of the cover, which is diftinguifhed by the letters A, A, A, A, placed at each corner. About the upper plate or cover is a rim to prevent the difcharging liquor from running off, which is diftinguifhed by the letters B, B, B, B.

At each corner of the plate is a round hole, working upon a pin faftened in the under plate or fole of the prefs, to guide the bottoms of the perforated tubes perpendicularly over the holes in the lower plate. Befides thefe guides, there are two notches C, C, which grafp the upright pillars D, D, and thus the upper plate, when rifing and finking, is guided in fix different places. The elevation and depreffion of the cover is effected by turning the fcrew E. The form of the upper and under plates, and the pattern being reprefented by *fig.* 3, the remaining parts of the prefs will be more clearly feen by referring to *fig.* 4, which is a tranfverfe elevated fection of the prefs, cut in the direction of the dotted line F F, *fig.* 3.

The letters of reference in *fig.* 4, are the fame for each part, as in *fig.* 3, but fome parts are diftinctly feen in the latter, which do not appear in the former, and thefe are diftinguifhed by additional letters. As in *fig.* 3, A A reprefent the upper plate or cover of the prefs. The rims are fhewn by the letters B, B. The notches which grafp the upright pillars are marked C, C, and the pillars D, D. The fcrew which raifes and finks the cover of the prefs is diftinguifhed by the letter E. Between the pillars D, D, is an arch of iron H H, in the centre of which is a box I, containing a female fcrew for working the fcrew E. The lower part of the fcrew E revolves in the focket G fixed to the cover of the prefs, and thus raifes or finks it as may be neceffary. Upon the fcrew E, is fixed a wheel K K, through the arms of which is put the lever ufed for fcrewing down and raifing the cover, as in other large preffes. The fole or bottom of the prefs is diftinguifhed by the letters L, L. It is placed exactly in a horizontal direction, and is fupported by fix ftrong iron perpendicular legs, namely, one at each corner, and the lower parts of the pillars D, D, in the middle. Between the cover and bottom, the cloth to be difcharged is placed at M M.

The mechanical part of this procefs is, in almoft every refpect, entirely fimilar to that ufed by cloth dreffers, bookbinders, and many other tradefmen who employ ftrong fcrew preffes. To enfure the accuracy of its operation, correctnefs of workmanfhip, and ftrength, are all that are neceffary, and thefe are indifpenfable. The prefs muft be fixed, fo that both the cover and bottom may be horizontal planes. The bottom muft be perfectly level, and the perforated tubes in the cover muft all exactly touch the bottom, with equal preffure. The perforation of the tubes muft alfo correfpond exactly with the holes or apertures in the bottom, and the guides muft be fitted to work freely, but at the fame time to prevent any aberration of the cover in rifing or finking. From the great preffure neceffary when the cover is fcrewed down, great care ought to be taken that the whole of the fupporters of the prefs be exactly perpendicular, and that the prefs, when properly placed, fhould be ftrongly fecured.

The apparatus being well made and properly fecured, the procefs of manufacture is remarkably fimple. The cloth is woven of the natural colour of the cotton wool, and in this particular the manufacture, befides the beauty of its appearance, poffeffes a decided preference, in point of economy, over the Pullicate handkerchiefs, and other imitations of the Indian manufacture, where the pattern is produced in the loom, and the ftuff previoufly dyed in the ftate of yarn. Whatever care has been taken to prevent the tedious and repeated proceffes, which are ufed in the dyeing of Turkey red, from injuring the yarn, every perfon, at all converfant with the manufacture of coloured yarn, will be fenfible that all the fubfequent ftages of the operation of forming it into cloth are much impeded by the preparatory change which it has undergone in the dyers' hands; and from the nature of the procefs this perhaps applies to no colour in fo great a degree as to Turkey red. It follows that the wages given to winders, warpers, and weavers, muft be raifed in proportion to the impediments which they have to encounter, and to the fmaller quantity of cloth which their exertions can of confequence produce. Befides this, all handkerchiefs ornamented in the loom, are confined to what is called *checking*; and all the various colours muft be interwoven either parallel or at right angles to each other, unlefs very complicated and confequently expenfive mounting be ufed. The time confumed in changing the colours of the woof alfo impedes, in no fmall degree, the fpeed of the operation; and thus both the ftate and nature of his materials, and the mechanical operation neceffary to accomplifh his purpofe, tend at the fame time to enhance the wages of the weaver, in proportion to the quantity of cloth which is the product of his labour.

But as the imitation Bandanas are woven perfectly plain, the fame as calicoes, cambrics, and other ftout fabrics, no impediment of this kind occurs, and the whole labour and expence are in the fubfequent procefs, and the fum funk in procuring the prefs.

After the cloth is woven, it is cleared from impurities, and dyed Turkey red, exactly in the fame way as yarn is dyed. When the colour is to be difcharged, the cloth is neatly folded in fquares, of about 10 or 12 folds, and laid upon the fole or under plate of the prefs, the cover being previoufly elevated by means of the fcrew and wheel. When the cloth has been properly difpofed, as at M M, the cover is brought down in contact with its upper furface, and a lever being applied to the fcrew and wheel, the upper and under plates are firmly fcrewed together, the cloth being between them. The under part of each of the perforated tubes now preffes hard upon the upper furface of the cloth, and being perpendicularly over the holes in the under plate, no part of the difcharging liquor can efcape, excepting

through

through the apertures which form the pattern. These apertures are distinguished in the section. *fig.* 4, by the numbers 1 to 8. The press being screwed down, the discharging liquor is poured upon the cover, and being confined by the rim passes through the apertures, and discharges the colour from those parts of the cloth which it passes through, being prevented from spreading upon any other part by the power of the screw. The discharging liquor is received into a trough placed under the lower plate of the press, and distinguished by the letter N. From this trough it is conveyed, by a spout, into vessels placed to receive it, and preserved; for although it loses much of its chemical quality in passing through the cloth and discharging the colour, it retains so much as still to be of service in many of the inferior operations of clearing and whitening of cloth. The discharge of the colour is effected by the action of the liquor in about eight or ten minutes. When the liquor has passed through, the cover of the press is raised, the cloth is taken out, and another piece being substituted, the operation goes on as before.

When two industrious persons are employed, for the purposes of folding the cloth, working the press, and applying the liquor, it is calculated, that the operation, for one piece of 12 handkerchiefs, occupies about 15 minutes; consequently, two persons can discharge 48 or 50 dozens of handkerchiefs in one day of 12 working hours.

The operation requires only care and attention; for if the press be properly constructed, nothing more is required than to fold the handkerchiefs neatly, to lay them square upon the under plate of the press, and to be careful that the cover is tightly screwed down before the liquor is applied. When the handkerchiefs are taken from the press, the discharged spots do not appear white, but of a dull straw colour. The common operation of clearing, however, very soon gives a pure white to the spots, and adds brilliancy to the Turkey red ground. Those who have been longest in the habit of working these presses, consider a most important point to be, attention to the cement which is put where the perforated tubes are connected with the cover of the press. This certainly requires frequent and careful examination; for if any of the liquor is allowed to escape here, the ground of the handkerchiefs will be materially injured by its operation upon the colour. As the invention is recent, and the study of practical chemistry rapidly advancing, it is not improbable that some composition of superior efficacy, for this purpose, may soon be discovered. The cement used answers the purpose tolerably well, but requires great attention on the part of the person to whom the charge of the press is entrusted.

It has been already observed, that the chemical liquor generally employed is a solution of the oxymuriate of lime.

The method of preparing this liquor was discovered and first introduced into practice by Charles Tennant, esq. St. Rollocks, near Glasgow; and is, at present, universally used by those engaged in the manufactory. The following remarks, upon its practical application, have been obligingly communicated to the writer of this article by that gentleman, which he will copy in his own words:—

"Agreeable to my experiments, a solution of the oxymuriate of lime, of 1.010 specific gravity, decomposed by $\frac{1}{100}$th part of its weight of sulphuric acid, of 1.846 specific gravity (the usual quality of marketable ore), is the most advantageous preparation for discharging Turkey red; and what, I believe, is in pretty general use with the trade in this quarter.

"As the oxymuriatic acid is but little soluble in water, when disengaged from its combination with the lime, the sooner it is used, after its separation by the sulphuric acid, the better; and this is done by simply filling the types with the solution, and allowing it to remain in them for so many minutes as proper, until the discharge is effected.

"When the discharge is completed, the acid liquor must be carefully washed out of the types previous to their being removed from their hold of the cloth."

It is hardly necessary to observe, that the word types, used by Mr. Tennant, refers to the perforated tubes fixed in the cover of the press, and previously described in the mechanical part of this article.

Some alteration in the construction of the presses has very recently been introduced into some of the manufactories. The chief difference from the press represented, consists in pressing down the cover by a great weight, instead of the action of the screw. Water has been used to give this weight, and is raised into a trough upon the cover by means of a forcing pump, when the pressure is to take place. This may certainly press more equally over the whole surface of the cover than a screw, which acts only upon one point, and in this particular may be an improvement. Few of these presses have, as yet, been used; but those which have, are said to answer very well.

DISCIPLE, from *disco*, I learn, one who learns any thing from another. Thus the followers of any teacher, philosopher, &c. are called disciples. In the Christian sense, they were the followers of Jesus Christ, in general; but in a more restrained sense, the disciples denote those alone who were the immediate followers and attendants on his person; of which there were seventy, or seventy-two. The names disciple and apostle are often synonymously used in the gospel history; but sometimes the apostles are distinguished from disciples, as persons selected from them, to be the principal ministers of his religion; of these there were only twelve. (See APOSTLE.) The Latins keep the festival of the seventy, or seventy-two disciples, on July 15; and the Greeks on January 4.

DISCIPLINE primarily signifies instruction and government; but the word is figuratively applied to a stated method of living, according to the rules of some profession.

We say the military discipline, the ecclesiastic or church discipline, the regular or monastic discipline, &c.

We do not say civil discipline, but instead thereof policy.

DISCIPLINE is also used in a peculiar sense for the chastisement, or bodily punishment, inflicted on a religious, who has been caught delinquent; or even for that which the religious voluntarily undergo, or inflict on themselves, by way of mortification.

Among all the austerities practised by the ancient monks and solitaries, Dupin observes, there is no mention made of discipline; in effect, it does not appear to have been in use in antiquity, unless to punish the monks who had been taken tripping.

It is commonly said that St. Dominic, and Peter Damian, first introduced the use of discipline; but F. Mabillon notes, that Guy, abbot of Pompofa, and others, had practised it before them. It is pretty certain, the practice was first established in the eleventh century, with design to redeem the penances the canons imposed on divers offences; and at length they came not only to redeem for themselves, but also for others. See F. MABILLON.

DISCIPLINE is also frequently used for the instrument wherewith a monk chastises, or mortifies himself; which is usually made of ropes, knotted hair, or twisted parchment; sometimes of broken rods. St. Jerom is painted with disciplines of iron chains, armed with spur-rowels, &c. See FLAGELLATION.

DISICPLINE,

Discipline, *Book of*, in the *History of the Church of Scotland*, is a common order, drawn up by the assembly of ministers in 1650, for the reformation and uniformity to be observed in the discipline and policy of the church. In this book the government of the church by prelates is set aside, church-sessions are established, the superstitious observation of fast-days and saints' days is condemned, and other regulations for the government of the church are determined. This book was approved by the privy-council, and is called the first book of discipline.

The puritans, in the reign of queen Elizabeth, who were zealous in their endeavours to effect a reformation of discipline in the national establishment, held in high estimation "a book of discipline," entitled "Disciplina ecclesiæ sacra ex Dei verbo descripta," *i.e.* the holy discipline of the church described in the word of God. This work was drawn up in Latin by Mr. Travers, a fellow of Trinity college, Cambridge; and printed at Geneva about the year 1574; and afterwards revised, corrected, and improved by Mr. Cartwright and other learned ministers at their synods. It was translated into English in the year 1584, and designed to be published for general use; but it was seized at the press, and all the copies were ordered to be burnt, as factious and seditious. A copy of it was found in Mr. Cartwright's study after his death, and reprinted in the year 1644, under a new title, *viz.* "A directory of government, &c. practised by the first non-conformists, in the days of queen Elizabeth, &c." This book contained those alterations in discipline, &c. for which the puritans contended. In the year 1586, more than 500 ministers, all beneficed in the church of England, useful preachers, of unblemished character, subscribed, with some exceptions, or declared their approbation of this book of discipline.

Discipline, *military*, denotes the exercise of those laws that are established for regulating the conduct of military men.

Discipline, *marine*, signifies the training up soldiers for sea-service, in such exercises and manœuvres as can be performed on board ships of war at sea.

DISCLAIMER, in *Law*, a plea, containing an express denial, renouncing, or disclaiming, of a thing alleged.

As if a tenant sue a replevin upon a distress taken by the lord, and the lord avow the taking, saying, that he holds of him as his lord, and that he distrained for rent not paid, or service not performed; then the tenant, denying to hold of such lord, is said to disclaim; and the lord proving the tenant to hold of him, on a writ of right *sur disclaimer* brought, the tenant loses his land. This disclaimer by a tenant is considered as a civil crime, and punished accordingly, by forfeiture of lands to the lord, on reasons most apparently feudal. (Finch. 270, 271.) Thus also, if in any court of record the particular tenant does any act which amounts to a virtual disclaimer: if he claims any greater estate than was granted him at the first infeodation, or takes upon himself those rights which belong only to tenants of a superior class (Co. Litt. 252.); if he affirms the reversion to be in a stranger, by accepting his fine, attorning as his tenant, collusive pleading and the like (ibid. 253); such a behaviour amounts to a forfeiture of his particular estate. (Blackst. Com. vol. ii. and iii.)

When a tenant hath disclaimed, upon action brought against him, he shall not have restitution on writ of error, &c. against his own act; but is barred of his right to the land disclaimed. (8 Rep. 62.) But a verbal disclaimer shall not take place against a deed of lands; nor shall the disclaimer of a wife during the coverture bar her entry on her lands. (3 Rep. 26.) Baron and feme may disclaim for the wife; though if the husband hath nothing but in right of his wife, he cannot disclaim. (2 Danv. Abr. 569.) A person who cannot lose the thing perpetually in which he disclaims, shall not be permitted to disclaim; a bishop, &c. may not disclaim because he cannot divest the right out of the church; although in a *quo warranto*, at the suit of the king against a bishop or others for franchises and liberties, &c. if the bishop, &c. disclaims them, this shall bind the successors. (Co. Litt. 102, 103.) If a man be vouched because of a reversion on a lease made by himself, he cannot disclaim; but an heir may disclaim, being vouched upon a lease made by his ancestor. (2 Danv. 569.) It is said not to be necessary, that the writ of right, *sur disclaimer*, should be brought against the person that disclaims; for if it be only against him that is found tenant of the land, though he be a stranger, it is not material. (2 Danv. 570.)

By statute 21 Jac. I. c. 16. s. 5, in all actions of trespass *quare clausum fregit*, in which the defendant shall disclaim any title to the land, and the trespass be by negligence, or involuntary, the defendant shall be admitted to plead a disclaimer, and that the trespass was by negligence, or involuntary, and a tender of sufficient amends before the action brought; and if the issue be found for the defendant, or the plaintiff be non-suited, the plaintiff shall be barred from the said action, and all suits concerning the same. Besides these disclaimers by tenants of lands, there are other disclaimers; thus, a man, denying himself to be of the blood, or kindred of another, in his plea, is said to disclaim his blood (F. N. B. 102.) If a man arraigned of felony, disclaim goods; being cleared, he loses them. (Standf. P. C. 186.)

Thus, likewise, in chancery, if a defendant by his answer renounces having any interest in the thing in question, this is a disclaimer: to which may be added, a disclaimer by renouncing an executorship of a will, or the right to an administration.

DISCLAMATION, in *Scots Law*, is that casualty by which a vassal forfeits his whole feu to his superior, if he disowns, or disclaims him, without ground, as to any part of it.

DISCLOSED, a term used for chickens, or hawks, newly hatched; also for buds, or flowers, just blown.

DISCOBOLI, Δισκοβολοι, from δισκος, and βαλλω, *I throw*, among the *Ancients*, an appellation given to those who gained the victory at the discus. See Discus.

DISCOID Flowers, in *Botany*, are such compound flowers as, having no radius, consist of regular tubular florets, crowded and parallel, and all together forming a surface nearly flat, as in *Santolina*, or exactly conical, as in *Spilanthus*. The same term is used, even though marginal florets be present, provided they are small and inconspicuous, as in *Artemisia*, *Tanacetum*, &c.

DISCOIDES Fibula, in *Natural History*, the name of a genus of the echinodermata, or sea hedge-hogs; the periphery of the base of these is exactly round, and the body of a convexo-concave figure. The principal species of this genus is the subuclus, which has sometimes a rosaceous top, the lines being very neat and elegant, sometimes a plain and smooth top; sometimes it is all over covered with extremely minute and fine striæ, and sometimes it is much flatter than at others. Klein's Echinoderm.

DISCONTINUANCE, an interruption, intermission, or cessation, of the course of a thing; as, discontinuance of possession, of a plea, process, &c.

Discontinuance, as to real property, is an injury, which consists in keeping out the true owner of an estate, by a

tenant

tenant whose entry was at first lawful, but who wrongfully detains the possession afterwards. This happens, when he, who hath an estate-tail, maketh a larger estate of the land than the law allows him to do (Finch. L. 190.); in which case, the estate is good, so far as his power extends who made it, and no farther. As if tenant in tail makes a feoffment in fee-simple, or for the life of the feoffee, or in tail: all which are beyond his power to make, for that by the common law extends no farther than to make a lease for his own life; in such cases, the entry of the feoffee is lawful during the life of the feoffor; but if he retains the possession after the death of the feoffor, it is an injury, which is termed a *discontinuance*:—the ancient legal estate, which ought to have survived to the heir in tail, being gone, or, at least, suspended, and for a while discontinued. For, in this case, on the death of the alienors, neither the heir in tail, nor they in remainder, or reversion, expectant on the determination of the estate-tail, can enter on and possess the lands so alienated. Also, by the common law, the alienation of an husband who was seized in the right of his wife, worked a discontinuance of the wife's estate; till the statute 32 Hen. VIII. c. 28. provided, that no act by the husband alone shall work a discontinuance of, or prejudice, the inheritance or freehold of the wife: but that, after his death, she or her heirs may enter on the lands in question. Formerly also, if an alienation was made by a sole corporation, as a bishop or dean, without consent of the chapter, this was a discontinuance, (F. N. B. 194.) But this is antiquated by the disabling statutes of 1 Eliz. c. 19, and 13 Eliz. c. 10; which declare all such alienations absolutely void, *ab initio*; and, therefore, at present no discontinuance can thereby be occasioned. Blackst. Comm. book iii. A discontinuance may be in five ways, *viz.* by feoffment, fine, recovery, release, and confirmation with warranty. (1 Rep. 44.) A discontinuance may be defeated, where the estate that worked it is defeated; as if a husband make a feoffment of the wife's land upon condition; and after his death, his heir enters on the feoffee for the condition broken; now the discontinuance is defeated, and the feme may enter upon the heir. Co. Litt. 336.

Discontinuance *of Plea*, is when divers things should be pleaded to in a suit of action, and some are omitted. If a defendant's plea answers to part only, it is a discontinuance; and the plaintiff may take judgment by *nil dicit*, for that which is not answered: but if the plaintiff plead over, the whole action is discontinued. 1 Nels. Abr. 660, 661. 1 Salk. 139.

If a justice-seat be discontinued by the not coming of the justices, the king commonly renews the same by his writ, &c.

Discontinuance *of Process* is somewhat similar to a non-suit; for, when a plaintiff leaves a chasm in the proceedings of his cause, as by not continuing the process regularly from day to day, and time to time, as he ought to do, the suit is discontinued, and the defendant is no longer bound to attend; but the plaintiff must begin again, by suing out a new original, usually paying costs to his antagonist. Anciently, by demise of the king, all suits depending in his court were at once discontinued, and the plaintiff was obliged to renew the process, by suing out a fresh writ from the successor; the virtue of the former writ being totally gone, and the defendant no longer bound to attend in consequence thereof; but, to prevent the expence, as well as the delay attending this rule of law, the statute 1 Edw. VI. c. 7, enacts, that, by the death of the king, no action shall be discontinued; but all proceedings shall stand good, as if the same king had been living. The discontinuance of an action is not perfect till it is entered on the roll, when it is of record. (Cro. Car. 236.) The plaintiff cannot discontinue his action after a demurrer joined, and entered; or, after a verdict, or writ of inquiry, without leave of the court. (Cro. Jac. 35. 1 Lil. Abr. 473.) It has been ruled, upon a motion to discontinue, that the court may give leave after a special verdict, which is not complete and final; but never after a general verdict. (1 Salk. 178. Hardw. 200, 201.) After issue and a verdict, the plaintiff cannot discontinue without consent of the defendant; for, if the plaintiff will not enter up judgment, the defendant may. (Salk. 178.) After demurrer argued and allowed, discontinuance may be allowed on payment of costs. 3 Lev. 440.

Discontinuance of process is helped at common law by appearance; and by stat. 32 Hen. VIII. c. 30. all discontinuances, miscontinuances which continue the suit by improper process, or by giving the party an illegal day and negligence therein, are cured after verdict. See Amendment.

DISCORD, in *Music*, is a sound which, when struck with another in counterpoint, is disagreable to the ear. See Counterpoint.

What renders discords disagreeable to the ear, is their always jarring, and we may say warring with each other, and arriving at the sensorium like two distinct sounds, though struck or sounded at the same instant.

Sometimes the interval is called a discord, and sometimes each of the sounds that form the discordant interval. But though any sounds that disagree may be termed discords, that title more particularly belongs to that of the two which is foreign to the harmony of the base.

There is in nature an infinity of discords; but though in music none are admitted, except such as belong to the genus and key in which the piece is composed, or into which it may modulate, and these are specified in the rules of composition.—What then are these rules? Have they any foundation in nature, or are they purely arbitrary? Let us examine. The physical principle of harmony resides in the common chord, or the harmonies of a single sound. All concords are derived from that source, and it is nature that furnishes this chord. But that is not the case with discords, at least with such as are admitted in music. We perceive, indeed, how they are generated; by the progression of consonant intervals and their differences; but we perceive not the physical cause which warrants our use of them in the composition of harmony. Nature points out the origin of such harmony as is grateful to our ears, and when it becomes otherwise, we stop.

There is a discord in the 7th division of every string. It is not indeed a true 7th; but it is more like that discord than any thing else, except the extreme sharp 6th; and it is so equivocal, that it will serve for either: suppose C the fundamental, the 7th division of the string will serve for B ♭ or A ※, for both which it serves on keyed-instruments.

Now, as nature gives this kind of 7th to every fundamental base, if we join the 7th with the 8th in practice, suppose the key to be G, we have the chord of the minor 7th to G, $\frac{6}{5}$ to B, and $\frac{4}{3}$ to D, discords which nature has pointed out, if not correctly produced. F and G are likewise the two 5ths, or 4th and 5th of the key of C; the perfect chords of which therefore furnish, with that of the key note C, the essential harmony to that and every other key.

Rousseau, therefore, not being able to find the origin of discord in nature, or in Rameau's system, has treated it as a

 mechanical

mechanical operation. But, are we never to ufe the minor modes which afford us fuch exquifite pleafure in plaintive and pathetic ftrains, becaufe its origin is out of our reach? Are we never to fmell at a rofe, becaufe we cannot account for its being more fragrant than the taudry poppy? And, becaufe in comparing fucceffively the founds of the diatonic fcale, major and minor, with the fundamental, Rouffeau, and fome other theorifts, find only two difcords, the 2d and the 7th, are we to ufe no others?

We were not quite fatisfied with the article *Difcord* in the laft fol. from Graffineau and Malcolm, and tried to make the matter more clear, pleafant, and intelligible from the ingenuity and eloquence of Rouffeau, who, in his Mufical Dictionary, has given us an article, or rather a differtation on the fubject, of 10 or 12 pages; but it contains nothing but a dry confutation of Rameau's origin of the minor mode, which was never favourably received or adopted, even by his moft zealous difciples, and has now been long forgotten.

We fhall therefore attempt no new phyfical or metaphyfical difcoveries concerning difcord; but fhall conclude this article by informing young mufical ftudents, that though Rouffeau has reduced all difcords to the 2d, or at moft to that and the 7th, which is but the 2d inverted; we think it right to inform them, that the 4th and the 9th are ftill regarded as difcords by many who will expect them to be regularly prepared and refolved, as well as the 5th when made a difcord by the 6th, and the 3d by the 4th; fo that it may be imprudent, and attended with fome inconvenience, if they are not ftudied and practifed, whatever they may be called; and we fhall only afk reformers of the old fyftem of harmony, if the 3d made a difcord by the 4th, the 4th by the 5th, the 5th by the 6th, and the 9th by the $\frac{5}{3}$, are *not* difcords, what *are* they?

See the regular preparation of all practical difcords. Counterpoint, *Pl.* XIV. XV. XVI. and paffing notes added to the latter.

Difcords are of two kinds: thefe that are regularly prepared and refolved, and paffing notes, in which no harmony is given.

In moving bafes, or divifions in the treble, all the notes not to be found in the chord on which the paffage is built, are paffing notes.

Padre Martini has given in fix bars (Saggio di contrap.) all the regular difcords, with their preparations and refolutions. See examples of Counterpoint in Types.

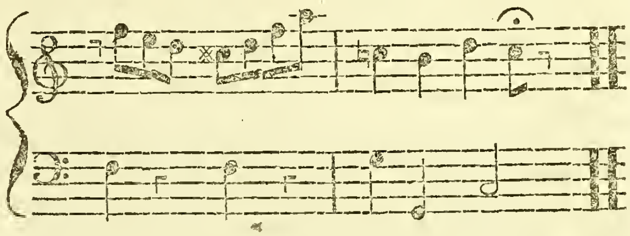
Difcords feem to have originated from *appoggiaturas,* or embellifhments of a treble part.

Sevenths refolved into 6ths, are appoggiaturas; as are the bafes carrying 2ds.

As melody quitting Canto Fermo, and plain counterpoint, began to receive ornaments, appoggiaturas feem to have been the firft that were received in harmony. The 4th made a difcord by the 5th at a clofe, is the firft that appears in the moft ancient counterpoint that has been preferved.

Man has been defined by the French, *animal d'habitude,* and faid by the Englifh to be "a bundle of prejudices." And melody in mufic may be faid to confift of a bundle of appoggiaturas; firft introduced by fingers, and for which it afterwards became the bufinefs of compofers to find harmony.

Great relaxation has taken place of late in the preparation of difcords; it ufed to be an inviolate rule never to jump to any difcord except the 7th; but Berthoven, op. 14. jumps to the 9th. We have formerly faid, that the preparation of difcords in vocal mufic was probably eftablifhed as a rule in favour of bad fingers, who were uncertain of hitting them right *per faltum.* But very pleafing and pathetic effects are to be produced by unprepared difcords. As all good tafte in mufic originates from good finging, fo good fingers were the firft to hazard, at a clofe, an unprepared 9th, as in the following example:



Old rules told us, that double-difcords muft be doubly prepared and refolved. See Mufic plates.

Rouffeau has given, in *Pl.* K. of his Dict. de Muf. *fig.* 1. two diatonic fcales, one, the natural fcale, in conftant and univerfal ufe; the other he calls the fcale of *Aliquots,* in which are introduced two new characters, for which we have no names or inftruments by which they can be expreffed: thefe are the falfe notes of the French horn and trumpet, which a few modern theorifts want to perfuade us, in fpite of our fenfes, are the true harmonies of nature. But they have never yet been admitted in an orcheftra, or written in a mufical compofition. We give the Greek enharmonic fcale, as a curiofity; but of which we can make no ufe in counterpoint, as we have no fundamental bafe for quarter tones. We have but two genera, one diatonic, and one chromatic, for the eye; when thefe are to be corrected, the key, and the ear of the performer, muft determine.

The new equivocal character given by Rouffeau and Kirnberger, for what are generally called the falfe notes, or 4th and 6th of the French horn and trumpet thus: ♭ fomething refembling a double B ♭.

Discord, *apple of, pomum difcordiæ,* a phrafe ufed to fignify the fubject, or occafion of fome mifunderftanding in a fociety.

Discord, *goddefs of,* in *Mythology,* called alfo *Até,* and *Eris,* is defcribed by Ariftides as having fiery eyes, a pale countenance, and livid lips, and as wearing a dagger in her bofom. This was the goddefs, who is faid, at the marriage of Peleus and Thetis, to have thrown the golden apple, on which was written, "To the faireft," which occafioned a contention between the goddeffes Juno, Minerva, and Venus; each pretending a title to the apple.

DISCORDANT, *out of tune,* falfe concords, or difcords, *intonazioni perfidi,* in melody and harmony.

DISCOVERT, in *Law,* denotes an unmarried woman.

DISCOVERY, the act of revealing or difclofing any matter by the defendant, in his anfwer to a bill filed againft him in a court of equity.

The courts of equity may in many cafes compel a difcovery, with a view of fubferving the general adminiftration of juftice. But if a bill is brought to aid, by a difcovery, the profecution or defence of any proceeding "not merely civil," in any other court, as an indictment or information, a court of equity will not exercife its jurifdiction to compel a difcovery, and the defendant may demur. (2 Vez. 398.) And in the cafe of fuits merely civil, in a court of ordinary jurifdiction, if that court can itfelf compel the difcovery required, a court of equity will not interpofe. (1 Atk. 288. 1 Vez. 205. 2 Vez. 451.) The fituation of a defendant may render it improper for a court of equity to compel a difcovery, either, 1. becaufe the difcovery may fubject the defendant to pains and penalties, or to fome forfeiture; or, 2. it may hazard

hazard his title in a cafe where in confcience he has an equal right with the perfon requiring the difcovery; though that right may not be invefted with a perfect title. It is a general rule that no one is bound to anfwer fo as to fubject himfelf to punifhment, in whatever manner that punifhment may arife, ot whatever may be its nature. But if the plaintiff alone is entitled to the penalties, and exprefsly waves them by his bill, the defendant fhall be compelled to make the difcovery; for it can no longer fubject him to a penalty. (1 Vern. 60.)

Discovery *of accomplices* is provided in the cafes of coining, robbery, burglary, houfe-breaking, horfe-ftealing, and larceny, to the value of five fhillings, from fhops, warehoufes, ftables, and coach houfes, by ftatutes 4 and 5 W. & M. c. 8. 6 and 7 W. III. c. 17. and 11 W. III. c. 23. and 5 Anne, c. 31. which enact, that if any fuch felon, being out of prifon, fhall difcover two or more perfons, who have committed the like felonies, fo that they may be convicted, he fhall in cafe of burglary or houfe-breaking, receive a reward of 40l. and in general be entitled to a pardon of all capital offences, excepting only murder and treafon; and of them alfo, in cafe of coining. And if any fuch perfon having felonioufly ftolen any lead, iron, or other metals, fhall difcover and convict two offenders of having illegally bought or received the fame, he fhall, by ftat. 29 Geo. II. c. 30. be pardoned for all fuch felonies committed before fuch difcovery.

It hath alfo been ufual for the juftices of the peace, by whom any perfons charged with felony are committed to gaol, to admit fome one of their accomplices to become a witnefs (or, as it is generally termed, king's evidence) againft his fellows; upon an implied confidence which the juftices of gaol-delivery have ufually countenanced and adopted, that if fuch an accomplice make a full and complete difcovery of that and all other felonies to which he is examined by the magiftrate, and afterwards give his evidence without prevarication or fraud, he fhall not himfelf be prefented for that or any other previous offence of the fame degree.

Discovery by *bankrupt*. See Bankrupt.

Discovery, in *Dramatic Poetry*, a manner of unravelling a plot or fable, very frequent in tragedies, comedies, and romances; wherein, by fome unforefeen accident, a difcovery is made of the name, fortune, quality, and other circumftances of a principal perfon, which were before unknown. See Catastrophe.

A difcovery fhould never be in vain, by leaving thofe who thus difcovered one another in the fame fituation and fentiments they were in before: in effect thofe difcoveries, which are immediately followed by a peripetia, or change of fortune of fome principal character, whereon the unravelling depends, are always the moft beautiful.

One of the fineft difcoveries ever brought upon the ftage, is that of Oedipus in Sophocles; for the minute he finds himfelf the fon of that Jocafta who was then his wife, he becomes, of the moft happy, the moft miferable of all men.

There are three forts of difcoveries: the firft by certain marks of the body, either natural or accidental: fuch is that of Ulyffes, who having received a wound in the thigh by a boar before the Trojan war, is difcovered by the old nurfe, upon wafhing his legs after his return home incognito.

The fecond by tokens: as the cafket of things, which the priefts found with Ion when he was expofed, difcovers Creufa, whom he was going to kill, to be his mother.

The third is made by remembrance: that is, when the fight or hearing of any thing occafions us to recollect our misfortunes. Thus, when Ulyffes heard Demodocus fing his actions at Troy, the memory of them ftruck him, and drew tears from his eyes, which difcovered him to Alcinous.

But the fineft fort is, that which arifes from the fubject, or incidents of the fable; as that of Oedipus from his exceffive curiofity, and the letter that Iphigenia fent by Pylades. See Tragedy.

DISCOUNT, in *Commerce*, an allowance made for the immediate advance of money which is not due till the end of a certain period, as on a promiffory note, or bill of exchange, which has two or three months to run from the time when it is difcounted.

The true difcount of any fum is, fo much as being deducted, will leave a fum which, in the time difcounted for, will, at intereft, amount to the original principal. Thus, one pound, difcounted for one year, is equal to that fum which, at the given rate, will, in one year, amount to one pound, and the difcount is the difference between this fum and one pound: now, as $1 + r : 1 :: 1 : \frac{1}{1 + r}$, the fum which, in one year will amount to one pound, and, confequently, $1 - \frac{1}{1 + r} = \frac{r}{1 + r}$ is the difcount of one pound for one year. On this principle, the difcount of one pound, for one year, at the feveral rates following, is found to be,

At 2 *per cent.*	- -	.019607843137
3	- - -	.029126213592
4	- - -	.038461538462
5	- - -	.047619047619
6	- - -	.056603773585
7	- - -	.065420560748
8	- - -	.074074074074
9	- - -	.082568807339
10	- - -	.090909090909

The difcount of one pound, for one year, multiplied by any fum, gives the difcount of that fum for one year: thus, to find the difcount of 160*l.* for one year, at 5 *per cent.* .047619 × 160 = 7*l.* 12*s.* 4½*d.*

The difcount for any number of days is found in the fame way as the difcount for one year; for, as one pound, increafed by its intereft for any number of days, is to 1*l.*, fo is 1*l.* to a fourth number, which will be one pound difcounted for the given days; and this, fubtracted from one pound, gives the difcount required: therefore, "divide one pound by one pound, increafed by its intereft, and the complement of the quotient is the difcount required." By this rule, the following difcounts of 1*l.* are found:

Days.	3 per. Cent.	4 per Cent.	5 per Cent.
1	.00008218	.00010958	.00013697
2	.00016436	.00021913	.00027390
3	.00024651	.00032866	.00041079
4	.00032866	.00043816	.00054765
5	.00041079	.00054765	.00068446
6	.00049291	.00065710	.00082124
7	.00057501	.00076653	.00095798
8	.00065710	.00087594	.00109469
9	.00073918	.00098533	.00123136
10	.00082124	.00109469	.00136799
50	.00409277	.00544959	.00680272
100	.00815217	.01084011	.01351351
200	.01617251	.02144772	.02666667
300	.02406417	.03183024	.03947368

The

The difcount for any number of days not contained in this table, cannot be found by the addition, or multiplication, of thofe which are contained in it; for if, from 1*l.*, we fubtract the difcount for any number of days, the remainder will be that fum which, in the fame number of days, would gain the difcount fubtracted; but if, in order to difcount 1*l.* for double the number of days, we fubtract twice the former difcount, the remainder being lefs than before, cannot gain fo much intereft, and, therefore, in twice the time cannot gain twice the intereft which the former fum gained; and which, being the fum now fubtracted, is what ought to be gained to amount again to one pound. A complete table, on the plan of the above, is given in Smart's Tables of Intereft, but few perfons will find occafion to refer to it.

The difcount of any fum, for any time, is fo much as will, in the given time, amount to the intereft of the fum to be difcounted; thus, if by retaining 100*l.* for one year, 5*l.* is gained at the end of the year, the proper equivalent to be received for the immediate advance of the fame is 4*l.* 15*s.* $2\frac{1}{2}$*d*, becaufe this fum will, at the end of the year, amount to 5*l.*, which is what the 100*l.* would have gained.

Thefe are the true principles of difcount; but the common mode of difcounting bills of exchange is, by finding the fimple intereft for the time the bill has to run, (including the days of grace,) and deducting fuch intereft from the amount of the bill, which gives the fum to be advanced. This is the method followed by the bank of England, the London bankers, and commercial perfons in general. It enables thofe who employ their money in difcounting, to make fomewhat more than 5 *per cent.* intereft of it; for a perfon difcounting 100*l.* for a twelve-month, advances only 95*l.*, by which, at the end of the year, he gains 5*l.*, confequently, he improves his money, at the rate of 5*l.* 5*s.* 3*d.* *per cent. per ann.*; and this circumftance frequently caufes the bankers and monied perfons to employ their money in difcounting for merchants and manufacturers, in preference to invefting it in the public funds, particularly when the latter are at a high price. The cuftomary difcount, according to this method, for the time a bill has to run, is found by any table of fimple intereft. See Interest.

Discount, is alfo commonly ufed for a certain allowance which manufacturers and wholefale dealers make on the price of their goods, either in all cafes when fold for money or credit, or more generally, only when fold for ready money, in lieu of a cuftomary credit. This difcount varies greatly in different branches of trade; thus on fome articles it is lefs than one *per cent.*; on others, fuch as aqua-fortis, and oil of vitriol, chariots, and coaches, cutlery, fire-arms, hofiery, needles, plants, and feeds, fadlery, &c. it is ufually five *per cent.* On black lace, fans, black lead, earthen ware, and fome other articles, the difcount is 10 *per cent.*, and on a few defcriptions of goods, as ribbons, perfumery, and hardware, the ufual difcount is ftill greater; on fome articles of Birmingham and Sheffield manufacture, a difcount of 50 or 60 *per cent.* is frequently allowed.

DISCOURSE, in *Logic*, from *difcurro*, I run over, an operation of the human mind, whereby it paffes, or proceeds from one thing to another, that is, from a known thing to an unknown.

The fchoolmen define it an act of cognition, whereby the mind deduces one thing from another: this it does, when, in confequence of an affent given to one propofition, it yields affent to another: fo that difcourfe confifts in a dependency of affents; and fuppofes fuch an order between the acts, that that belonging to the confequent arifes from that belonging to the antecedent. So that the intellect is then faid, *difcurrere*, to difcourfe; when, from an affent to one or more propofitions, it infers or draws an affent to another.

The object of difcourfe, therefore, or that about which the intellect is employed in difcourfing, is the connexion of extremes confidered with regard to fome third, or medium: thus, when it judges, that every reafonable animal is rifible, affirming, that there is a connexion between rifibility and rationality; and then finds, there is likewife a connexion betwixt man and reafonable animal; and afterwards gathering from the connexion found between rifible and man, with rational, that man and rifible have likewife a connexion, as both are connected with rational; it is faid to difcourfe.

Hence it appears, that difcourfe, whereon men ufe to value themfelves, does really betray the infirmity of the human underftanding; as it denotes a chain or fcale of feveral fucceffive acts of cognition neceffary to arrive at a truth. So that there is no difcourfe in God, who underftands all things originally and truly. See Reasoning.

Discourse, in *Rhetoric*, is ufed in the fame fenfe with oration.

DISCOUS Flower. Botanifts reckon two claffes of plants with a difcous flower. 1. Such as have the flower compounded, and the feed pappous, but the leaves and ftalks not milky when broken. 2. The corymbiferous plants, whofe flowers are compounded into a difcous figure, but their feeds not pappous. Of the former kind are the fleabanes, ragweeds, groundfels, &c. and of the latter are daifies, chamomile, tanfy, wormwood, &c. Thefe are diftinctions founded by Mr. Ray, but not regarded by the later botanifts.

DISCRETE, or Disjunct, *Proportion*, is, when the ratio between two or more pairs of numbers, or quantities, is the fame, and yet there is not the fame proportion between all the four numbers.

Thus, if the numbers 6 : 8 : : 3 : 4 be confidered; the ratio between the firft pair, 6 and 8, is the fame as that between 3 and 4, and therefore thefe numbers are proportional: but it is only difcretely, or disjunctly; for 6 is not to 8, as 8 to 3; that is, the proportion is broken off between 8 and 3, and is not continued all along, as it is in thefe following, which are called continual proportionals, *viz.* 3 : 6 : : 12 : 24.

Discrete *Quantity*, is fuch as is not continued and joined together. Such is a number, whofe parts, being diftinct units, cannot be united into one continuum; for in a continuum there are no actual determinate parts before divifion, but they are potentially infinite; wherefore it is ufually and truly faid, that continued quantity is divifible *in infinitum.* See Continuity.

DISCREETS, Discretæ, Low Latin, certain nuns who, from their offices or their qualifications, form the council of the abbefs, priorefs, or vicarefs, as is feen in the rules and conftitutions of the Clareffes, Benedictines, &c.

DISCRETION, in *Law*, the faculty of difcerning between right and wrong; and therefore whoever hath power to act at difcretion, is bound by the rule of reafon and law. (2 Inft. 56. 298.) Infants, &c. under the age of difcretion, are not punifhable for crimes; and want of difcretion is a good exception againft a witnefs. (2 Hawk. 434.) See Age, and Infancy.

The affeffment of fines on offenders committing affrays, &c. the binding of perfons to their good behaviour, and the duration of imprifonment in particular cafes, are fubmitted to the difcretion of all judges and juftices of peace; and, in many cafes, for crimes not capital, the judges have a difcretionary power to inflict corporal punifhment on the offenders.

DISCRETIONE, in the *Italian Muſic*, is uſed to direct the ſinger or player to execute his part with care diligently.

DISCRETIVE Propositions, are thoſe where various judgments are made, and denoted, by the particles *but*, *notwithſtanding*, or by words of the like nature, either expreſſed or underſtood. Thus, fortune may deprive me of my wealth, *but* not of my virtue; they, who croſs the ſeas, change their climate, *but* not their diſpoſition; are called diſcretive propoſitions.

DISCUS, among the *Ancients*, a name given to a round ſhield, conſecrated to the memory of ſome famous hero, and hung up in the temples of their gods, as a trophy of ſome great action.

From the figure of this diſcus, or rather of that which the Greeks and Romans uſed to divert themſelves with, eſpecially at their public games, and which was a round quoit of braſs, comes the word ſo much in uſe among aſtronomers, *viz.* the diſc of the ſun, or moon. See Disc.

Discus, Disceus, or Disciformis *Cometa*, a comet or fiery meteor reſembling a round diſh or platter. The chief of this kind is called a ſolar comet, from the likeneſs of its rays to thoſe of the ſun; it is called alſo roſa and chryſeus, from its bright ſilver colour mixed with a golden or amber one.

DISCUSSION, in matters of literature, ſignifies a clear treating or handling of any point, or problem. The word imports a ſhaking off, or diſpelling the difficulties and obſcurities with which a thing was embarraſſed. We ſay, ſuch a point was well diſcuſſed, when it was well treated of, and cleared up.

Discussion is alſo uſed in a medicinal ſenſe, for a diſperſing the matter of any tumour, or ſwelling, through the pores of the body; or an evacuation of ſome thin matter gathered in any part, by inſenſible perſpiration.

DISCUSSORIA, *Diſcutientia*, διαφορητικα, *diſcutients*. See Discutients.

DISCUTIENTS, in *Surgery*, are ſuch applications as tend to promote the abſorption of effuſed fluids or tumours, &c. All ſtimulating lotions, liniments, and even mere friction, will produce this effect; and to the ſame claſs belong Galvaniſm and Electricity. The moſt common embrocations now in uſe, as diſcutients, are ſolutions of ammonia and of ſoap, to which a proportion of alcohol is added. See Tumour, Bruise, Sprain, and Inflammation.

DISDAIN, in *Ethics*, is a high degree of contempt, or ſuch as precludes any intercourſe with the party deſpiſed.

DISDIAPASON, in *Muſic*, a compound concord, in the quadruple ratio of 4 to 1, or of 8 to 2.

The diſdiapaſon is produced when the voice goes from the firſt tone to the fifteenth, and may be called a *fifteenth*.

The voice ordinarily does not go farther than from its firſt tone to the diſdiapaſon; *i. e.* it does not go beyond the compaſs of a double octave; for the diſdiapaſon is an octave doubled. It may ſometimes riſe ſeveral tones above a diſdiapaſon, but the effort or ſtruggle disfigures it, and makes it falſe. In reality, the ancient ſcale, or diagramma, only extended to a diſdiapaſon.

Disdiapason-*Diapente*, a concord in a ſextuple ratio of 1 to 6.

Disdiapason-*Diateſſaron*, a compound concord in the proportion of 16 to 3.

Disdiapason-*Ditone*, a compound conſonance in the proportion of 10 to 2.

Disdiapason-*Semiditone*, a compound concord in the proportion of 24 to 35.

DISEASE, in *Medicine*, that condition of the animal economy, in which one or more of the functions is altogether impeded, or is performed with difficulty or with pain.

Various definitions of diſeaſe have been given by different phyſicians. Some have laconically defined it *the abſence of health*, forgetting that this involves another definition, that of *health*. Some have deſcribed it as exiſting in particular conditions of the fluids, or of the ſolids. But it is unneceſſary to enquire into the variety of definitions of diſeaſe, ſince the word is well underſtood by all, and is uſed under the ſame acceptation by the peaſant and the philoſopher.

Health and diſeaſe are relative rather than poſitive terms. Few perſons have every organ and function of the body in the moſt perfect ſtate, while yet they may be conſidered as in health; for a very conſiderable variety of condition, both in the mental and bodily functions, is compatible with health. Thus one perſon may be poſſeſſed of great muſcular ſtrength, another may be remarkable for the feebleneſs of his muſcles; yet the health in both may go on uninterrupted. One perſon may be capable of digeſting the moſt inſoluble food, and in large quantities; another may have little appetite for food, and be unable either to take or digeſt any, but the moſt moderate in quantity, or the moſt light and digeſtible in quality; yet neither ſhall be in a ſtate of diſeaſe. Thus, alſo, one ſet of individuals, reſiding in a crowded city, and another in the country, may be both healthy, *i. e.* all their functions may go on regularly, without impediment or uneaſineſs; yet the florid countenance, the ſtrong powers of muſcle, the great digeſtive faculties of the ploughman, mark a conſiderably higher health, a more perfect performance of the functions, than takes place in the inhabitant of the crowded city, whoſe complexion, ſtrength, and appetite, are obviouſly characteriſtic of leſſer powers. The terms health and diſeaſe, therefore, are in ſome degree relative, and muſt be conſidered in regard to an individual, as compared with the generality of men, and with himſelf at different times.

Diſeaſe may occur in all parts of the body, in the fluids and the ſolids, and in each particular organ and function; it may occur ſingly, in one part, or in ſeveral parts at the ſame time: hence diſeaſes may be ſimple or complicated. But the moſt ſimple diſeaſes with which we are acquainted, produce ſeveral morbid appearances, or *ſymptoms*, by which alone they are diſtinguiſhed from each other. Some of theſe are occaſional and accidental; others are conſtant, and ſerve to define and characterize the diſeaſe: and ſome again are the effects of thoſe which ariſe from the original cauſe of the diſeaſe, and are called *ſymptomata ſymptomatum*, the ſymptoms of ſymptoms.

The ſymptoms or ſigns of diſeaſes which are obſerved in the ſick, are extremely various and numerous; yet a knowledge of them is requiſite, both with a view to learn the nature of, and to alleviate or remove the diſeaſes. The ſymptoms are the external characters of diſeaſes, and by obſerving them in certain congeries or groups, like the natural hiſtorian, we acquire a knowledge of thoſe which are commonly connected, thoſe which only accidentally meet together, and thoſe which appear to be incompatible. Experience has pointed out to us the means by which certain congeries may be alleviated; and where our remedies fail, an examination of the organs, after death, enables us to obſerve the connection between certain groups of external ſigns, and the diſordered condition of certain organs. We have a ſtill more uſeful and direct guide, in aſcertaining the ſeat and nature of a diſeaſe, from its external ſigns; namely, that which ariſes out of our knowledge of the nature of the functions of each reſpective

refpective organ in health, or from the fcience of phyfiology; which latter is, of courfe, founded upon the knowledge of anatomy. For it muft be obvious, that, if the function of digeftion is impeded or fufpended, the ftomach, by which that function is performed, is the organ difeafed; if the voluntary power, or the intellectual faculties, are impaired, the brain, which is the common centre of fenfe and motion, is neceffarily to be confidered as the immediate feat of the diforder. But thefe conclufions, again, frequently require the correction of obfervation and experience. For fo great and numerous are the *fympathies* between different and diftant parts of the animal frame, that the functions of a particular organ are frequently difordered when no effential difeafe exifts in it; but when the original difeafe is in a diftant organ. Thus, the ftomach is violently difordered, ficknefs and vomiting being excited, when injury is done to the brain; and, *vice verfâ*, the brain is often affected with pain, giddinefs, &c. when the ftomach is deranged. In eftimating the fymptoms of difeafe, therefore, all thefe confiderations muft be taken into the account.

The fymptoms of difeafe in the human economy, may be ufefully referred to three heads; to impeded functions, uneafy fenfations, and manifeft changes in the appearance, or other qualities of the body. For every difeafe confifts principally in the derangement of fome function; but no function can be much impeded or deranged, without occafioning fome pain or uneafinefs, by which the patient is informed of his indifpofition; nor can any one labour under a difeafe for any length of time, without fuffering fome change from that appearance and form of the perfon, or that complexion of the countenance, which is wont to be connected with good health, as one of its agreeable characteriftics.

Among the figns of difeafe, thofe of the lefions of the animal functions are particularly to be obferved; the figns of derangement, for example, of the fenfes, and the voluntary motions. Each of the external fenfes, of hearing, feeing, &c. may be difordered in various ways; they are fometimes found dull and defective, at other times preternaturally acute, or not exerted without pain; fometimes they are altogether deranged; the eye reprefenting objects incorrectly, or the ear confounding founds. The internal fenfes, or intellectual functions, are alfo varioufly affected by difeafes, as in delirium, mania, melancholia, &c.; thefe demand the moft rigid attention from the phyfician, not only becaufe thefe derangements conftitute of themfelves difeafes of the utmoft importance, but becaufe they afford ftriking indications of the nature, increafe, and remiffion of other important difeafes, efpecially in the various kinds of fever, inflammation, &c. Upon the fame grounds the faculty of motion muft be obferved in all its lefions; whether it be fimply defective, as occurs in difeafes in general, which is termed debility; or loft, as in palfy; or preternaturally increafed, as fometimes happens under particular morbid ftates of the brain; or laftly, irregular, as in convulfions, cramp, and other fimilar diforders.

The ftate of the fick in regard to fleep ought alfo to be attended to; for, whether we confider it as a function of the body, or as the fufpenfion of other functions, it follows its natural laws, in a ftate of health, and thefe are ufually interrupted in the generality of difeafes; fo that fleep either altogether forfakes the patient, or it is too intenfe, as in a ftate of coma, or interrupted at fhort intervals, or accompanied with inceffant and frightful dreams; and it is often altogether unrefrefhing.

The confideration of the figns of difeafe in the vital functions is of ftill more importance, not only becaufe we hence learn more fully the nature of the difeafe, and the condition of the patient; but becaufe they are in themfelves dangerous, when they are fevere. Of this fort are all the varieties of the pulfe; the feeble, fmall, ftrong, hard, irregular, or intermitting pulfe, demand particular attention, as they imply a defect of the powers of the circulation and the motion of the blood, or a morbid increafe of ftrength and motion, or an irregular and imperfect action of the heart; thefe are efpecially obfervable in fevers, inflammations, and faintings.

The affections of the function of refpiration are the next in importance. The unufual quicknefs or tardinefs of the breathing; or a difficulty, or noife in infpiration, as in afthma, the ftertor of apoplexy, or in croup; coughing, fneezing, fighing, or other modifications of breathing, are all indications of difeafe, which muft not be overlooked. And to thefe the various affections of the voice muft be added.

Farther, the fymptoms of lefion in the natural functions muft be fedulouflly obferved. The hunger or thirft, the defect, excefs, depravation, and every unufual condition of the appetite; the various changes in the act of eating, fwallowing, and the errors of digeftion, fuch as eructations, acidity, ficknefs, &c.; the ftate of the bowels, whether too much bound, or too much relaxed, whether flatulent, or in pain; the condition of the ftools, and of the other fecretions and excretions, which come more particularly under the cognizance of our fenfes, as the perfpiration and urine; the excefs, defect, difficulty, or depravation of thefe refpectively;—in a word, all the circumftances of this nature muft be inveftigated. Nor are the functions peculiar to each fex, more particularly thofe of the female, to be overlooked.

As to the fecond head of morbid fymptoms, uneafy or painful fenfations, they are the moft frequent concomitants and figns of all difeafes; few difeafes are free at leaft from uneafinefs. For as there is a degree of pleafurable feeling belonging to the healthful action of all the organs of the body; fo, when thefe are interrupted and difturbed, the fick man fuffers pain, anxiety, and various difagreeable fenfations. Befides the various modifications of pain which we defcribe by comparing them with the fenfations produced by different caufes, fuch as a burning, ftinging, ftabbing, gnawing pain, a fhooting, throbbing, binding pain, and fo forth; itching, tingling, a fenfe of laffitude, of torpor, or numbnefs, of ftupor, of heat, of cold, of weight, naufea, giddinefs, faintnefs, ringing in the ears, and a multitude of uneafy feelings, indicate the varieties of difeafe. Sometimes the feverity of thefe feelings conftitutes the principal part of the difeafe; and they agitate and diftrefs or terrify the patient fo much, that they become more terrible than even the apprehenfion of death; indeed, in many cafes, thefe painful fenfations are by no means deftitute of danger, from whatever caufe they originate, as they may wear out the powers of life by their inceffant irritation.

The third head of figns of difeafe comprifes all thofe manifeft morbid changes, which do not come under the preceding, and which we learn from our own obfervation, and not from the words or complainings of the fick. Thefe are the morbid colour of the body, efpecially of the countenance, whether it be unufually pale, red, yellow, dufky, livid, or variable; the peculiar afpect or expreffion of countenance, dependent on the actions of the mufcles of the face, or on the circulation of the blood, and often on the ftate of the mind; an afpect or expreffion not eafy to be defcribed, but which affords a better index of the condition of the *vires vitæ*, and of the increafe or diminution of difeafe, than any language can exprefs. In particular, the ftate of the eyes fhould be examined; the languor or heavinefs, unufual rednefs, brilliancy, wildnefs, or diftortion, and other morbid appearances of the eyes, as the hollownefs, inequality of

of motion, or of apparent fize, &c. are indications of various ftates of difeafe. The condition of the mouth, and particularly of the tongue, as rednefs, whitenefs, foulnefs, blacknefs, drynefs, afford important indications of the degree, increafe, and decreafe of the difeafe, as they remain ftationary, or become more or lefs obvious. The peculiar odours, which arife from the patient, or from his excretions, fometimes contribute to point out the nature of the difeafe; as the unufual fœtor of the pulmonary and cutaneous halitus; or of the whole body, as in fmall-pox; of a part, as in cancer; the fmell and tafte of the urine in diabetes, &c. And many of the morbid qualities of the body may be afcertained by the touch; as the heat, cold, drynefs or moifture of the fkin, which are particularly important in the febrile ftate; and the hardnefs, rigidity, foftnefs, thicknefs, fwelling, or emaciation of different parts of the body, or of the whole, in various other difeafes. Thefe manifeft qualities of difeafe ought to be the more carefully inveftigated; becaufe they are eafily obferved, and by no means fallacious, nor can they be concealed by the patients; and befides, an obfervation of them often fuperfedes the neceffity of afking many difagreeable queftions.

Thefe various impediments of the functions, diftreffing fenfations, and obvious external changes of the body, comprifing all the morbid phenomena which are obferved, occur under various combinations, as to number and degree, conftituting the characters of the different difeafes of the human frame. Each of thefe combinations, or groups of fymptoms, has a few permanent ones, which mark its effential nature. Thefe are called its diagnoftic, or diftinguifhing fymptoms, and phyficians have long ago pointed thefe out in moft of the forms of difeafe. Within a century back, thefe have been claffed and arranged, after the manner of the natural hiftorians, into a regular fyftem, each form being diftinguifhed by its generic and fpecific characters. See NOSOLOGY. At prefent we treat of difeafe in general.

The *caufes* of difeafe are confidered by phyficians, as three-fold; firft, the *proximate* caufes, which fignify the morbid condition itfelf; fecondly, the *remote* caufes, which are either *predifpofing*, or *occafional* caufes, as already explained. See CAUSE in *Medicine*.

A pre-difpofing caufe, or pre-difpofition to difeafe, is inherent in the body, although it may often originate from external circumftances; but the occafional, or exciting caufe, may be either internal or external. When they concur in their influence, difeafe is produced, which neither could occafion alone. For every perfon, to whom an exciting caufe of difeafe is applied, does not fuffer difeafe; nor do thofe in general, who are already pre-difpofed to difeafe, fall into it, unlefs an exciting caufe acts upon them. Some pre-difpofitions are obvious to our obfervation; fuch as general or partial debility of the folids, a morbid irritability of the fame parts, a fulnefs of habit, with great ftrength, &c.; in the latter of which ftates inflammatory difeafes are readily excited; in the others, nervous and chronic diforders of various fpecies.—There are fome exciting caufes of difeafe, neverthelefs, fo powerful in their agency, that however fteady the health and ftrength of individuals, they will produce their effects. Thus the poifon of fmall-pox, and of fyphilis, will infect the ftrongeft; other poifons will produce death under any circumftances of health; and cold and heat will injure the body in various ways. And exciting caufes, which do not immediately occafion difeafe, by continuing their influence, gradually corrupt the moft healthy conftitution, and induce a pre-difpofition to various diforders. For the fame agent may be at one time an exciting, and at another an occafional caufe; as may be illuftrated in the inclemency and viciffitudes of the weather, in intemperance and luxury, and fo forth. It is of confiderable importance in the practice of medicine to afcertain thefe remote caufes of difeafes, both with a view to prevent their ill effects, and to anticipate their agency; and experience has done much in the inveftigation, as will be feen under the articles of Difeafe refpectively.

The remote caufes of difeafes in the human body operate varioufly. Many are purely *mechanical*, and injure the mechanical ftructure; fuch as blows, wounds, bruifes, ligatures, extraneous fubftances introduced, &c. whence originate various inflammations, impofthumes, fractures, diflocations, and difeafes in the functions of particular organs, thus injured. Others operate *chemically*, that is, decompofe the parts to which they are applied, or interrupt new combinations of matter, neceffary to be carried on: of the former fpecies are fome chemical poifons; fuch as cauftic potafs, muriate of mercury or corrofive fublimate, nitrate of mercury, arfenic, &c. of the latter fpecies, is the refpiration of gafes or airs, not containing oxygen, or containing carbonic acid, or other deleterious fubftance, which interrupts the change of the blood in its paffage through the lungs.

But the great majority of caufes of difeafe act upon the living folid, the irritable fibre, or the nervous energy, or by what other name the animal power of being excited by ftimulus may be denominated. This power or property is peculiar to living bodies; and various phenomena arife from its operation, from its excefs or defect of exertion, from the excefs or defect of the ftimulation applied to it, &c. See EXCITEMENT. Perhaps the moft common exciting caufes of difeafe, through the medium of the nervous power, are *heat* and *cold*, their viciffitudes and modifications, as with drynefs, moifture, &c. After Sanctorius had drawn the attention of phyficians to the infenfible perfpiration, and while the humoral pathology prevailed, the morbid operation of cold was fuppofed to confift folely in the fuppreffion of the perfpiration, which was faid to be thrown back into the fyftem, and to fall upon particular organs, there producing difeafe. But we have no evidence of this mechanical transference of fluids; and the modern theory which attributes the operation of cold and heat to the irregularity of vafcular action, confequent on the great variations in the ftimuli applied to the body, appears to be more confiftent with the general laws of animal economy. See COLD; CATARRH; &c. From the operation of heat and cold, which, ftrictly fpeaking, are but degrees of the ftimulus of heat, inflammation is occafionally produced in every organ of the body: hence Catarrh, Pleurify, Rheumatifm, Phrenfy, &c.; hence alfo many difeafes of the ftomach, the bowels, and the fkin; and hence various idiopathic fevers in all climates.

Next to heat and cold, the influence of *food* and *drink*, as exciting caufes of difeafe, acting on the nervous fibre, may be confidered as moft general. Thefe circumftances, indeed, influence the body in a double manner: they tend, in many inftances, firft to induce a pre-difpofition to difeafes, fo that other exciting caufes readily act upon the conftitution, giving rife to various maladies: this pre-difpofition may confift in a plethoric ftate of the body, which is liable to inflammatory diforders; in a debilitated ftate, from the exceffive abufe of ftrong liquors, which expofed to various chronic complaints, &c. Or they may act both as pre-difpofing and exciting caufes; thus they produce a gouty conftitution, and this being eftablifhed, an occafional debauch will bring on a paroxyfm: and the fame may be faid with refpect to

to apoplexy and hemiplegia. In ſhort, errors in food and drink daily excite diſeaſes. Not to mention drunkenneſs and its immediate conſequences, the head, the ſtomach, the bowels, the kidnies, the conſtitution at large, are variouſly affected by this cauſe; and head-ache in all its forms; ſickneſs, acidity, flatulence, and various forms of dyſpepſia, and of thoſe diſeaſes termed bilious; colic, diarrhœa, dyſentery, and other inteſtinal affections, as well as general fever, in different ſhapes, are all the common reſult of exceſs and miſmanagement in regard to food and drink. (See DIET.) Imperfect nouriſhment, on the other hand, leads to a hoſt of chronic diſorders.

Contagions, or effluvia ariſing from the body under particular ſtates of diſeaſe, as well as the miaſmata from marſhes, &c. excite numerous diſeaſes. The mode in which they operate upon the irritable fibre is not clearly underſtood; but the laws, according to which they are propagated, have been ſatisfactorily inveſtigated. (See CONTAGION.) Their deleterious influence on the nervous ſyſtem, when in a concentrated ſtate, has in ſome inſtances been ſo great, that an almoſt immediate extinction of life has enſued. In the caſe of the plague, almoſt every nation in the world has ſuffered from the morbid effects of contagion. The ſmall-pox, ſcarlet fever, meaſles, and other ſpecific contagions, as they have been called, as well as the contagion of typhus fever, which may be produced under many circumſtances, all afford examples of this ſort of exciting cauſes of diſeaſe. Nor are the non-volatile contagions to be overlooked; the virus of ſyphilis, gonorrhœa, ſcaldhead, itch, &c. operates in a ſimilar way on the living ſyſtem, and induces a ſtate of diſeaſe reſembling that under which it was generated reſpectively.

The animal poiſons, and the vegetable narcotic drugs, have a powerful operation on the nervous power; the former chiefly when infuſed through a wound, and conveyed by the blood to the ſenſorium; the latter alſo through the medium of the ſtomach. Of the former are the poiſon of the viper, rattle-ſnake, &c.; of the latter ſpecies are opium, henbane, cicuta, belladonna, and a numerous tribe beſides; and to theſe we may add alcohol, or diſtilled ſpirits, in the various ſhapes of gin, rum, whiſky, &c. all of which have produced a multiplicity of diſeaſes, and often, when taken in ſufficient quantity, have ſpeedily annihilated the living power.

Among the cauſes of diſeaſe, acting through the medium of the nervous energy, the mental affections muſt be enumerated. All ſtrong or long continued emotions of the mind tend to produce diſeaſes; they derange all the bodily functions, eſpecially the digeſtion and the reſpiration; they interrupt the refreſhment of ſleep, and often, indeed, when ſudden and violent, at once induce diſeaſe, ſometimes death.

Errors in reſpect to ſleep and excerciſe, likewiſe often derange the nervous ſyſtem, and occaſion diſeaſes; eſpecially long watching, over-fatigue, &c.

Many diſeaſes, when once induced, become the pre-diſpoſing, and even exciting cauſes of others. The debility occaſioned by acute diſeaſes, becomes a pre-diſpoſing cauſe to the attacks of other acute and chronic diſeaſes, and eſpecially to a repetition of the ſame acute diſeaſe. Thus, a perſon who had been free from inflammatory ſore throat during the greater part of his life, being expoſed to a powerful exciting cauſe, ſuffers an attack of that diſeaſe, and henceforth the ſlighteſt expoſure to cold will bring it on again. One ſpecies of diſeaſe often excites another: thus, a tuberculated ſtate of the liver induces dropſy of the belly, by impeding the circulation through the hepatic veins, and therefore through the meſenteric and inteſtinal veſſels: ſcarlet fever often brings on anaſarca; common catarrhal inflammation of the bronchial membranes will give riſe to ulceration in the lungs, and induce a fatal conſumption, &c.

Many of the pre-diſpoſing cauſes to diſeaſes, of a particular ſort, conſiſt in obvious qualities: 1. The *age:* many diſeaſes are peculiar to infancy, others to manhood, others again to old age. Hydrocephalus, croup the irritations of dentition, ſtrophulus, and ſome other cutaneous eruptions, occur almoſt excluſively in the early years of life: the more acute and inflammatory diſorders, as well as diabetes, conſumption, and ſome chronic complaints, are moſt frequent in the middle ages; and in the decline of life, chronic diſeaſes of the lungs, kidneys, bladder; the failure of the external ſenſes, and of the faculties of the underſtanding; palſy, chronic rheumatiſms, &c. are the prevailing diſeaſes. 2. The *ſex.* Each ſex has its peculiar prediſpoſitions in many reſpects; the male, being the more robuſt, is more liable to acute inflammatory diſeaſes; the female, poſſeſſing the more irritable fibre, ſuffers more frequently under hyſterical and nervous complaints, not to mention thoſe connected with the ſexual organs, with the ſtate of pregnancy, &c. 3. *Hereditary conſtitution.* That a liability to particular diſeaſe is tranſmitted from parent to offspring, as well as a reſemblance in external form, and in manner, voice, &c. is too well known to require any evidence to be adduced here in proof of it. The ſins of the fathers are often viſited upon the children, in a phyſical ſenſe, for many generations. The gout, mania, ſcrofula, epilepſy, and many other forms of diſeaſe, are thus obſerved to deſcend through a long ſeries of deſcendants.

The exiſting cauſes of particular claſſes of diſeaſe, are likewiſe obſerved under particular circumſtances of life. Many *trades* give occaſion to certain maladies; thus the painter, the glaſs-cutter, the white-lead manufacturer, and every artiſan in the habit of uſing lead, is liable to attacks of *colica pictonum*, or painter's colic, and to a peculiar and diſtreſſing palſy of the hands, which enſues: millers, hair-dreſſers, chaff cutters, and all thoſe who are expoſed to breathe an atmoſphere, in which various ſubſtances are ſuſpended in the form of an impalpable powder, are liable to aſthma, dyſpnæa, pulmonary conſumption, and other diſeaſes of the lungs: thoſe employed in very ſedentary occupations, frequently ſuffer much from ſtomach complaints, head-ache, hypochondriaſis, and other diſeaſes of debility. Sailors, on long voyages, when confined ſtrictly to the uſe of ſalted animal food, are ſubject to the ſcurvy, a diſeaſe which is comparatively rarely ſeen, except under ſuch circumſtances. In the ſame way, armies in the field are expoſed to particular diſeaſes, dyſentery, infectious fevers, &c. (See CAMP-*diſeaſes*.) Climate, ſeaſon, and peculiar epidemic conſtitutions of the atmoſphere, are alſo ranked among the circumſtances modifying diſeaſes.

Diſeaſes have a conſiderable influence in modifying each other. We have already obſerved, that they ſometimes give riſe to one another; but they likewiſe are converted into each other; *i. e.* the original diſeaſe will excite a ſecond, and will itſelf diſappear. When a ſimilar diſeaſe is transferred from one part to another, or when a diſeaſe, of one kind, ceaſes in a part, and another diſeaſe ariſes in another part, this is termed a *metaſtaſis*. See CONVERSION *of diſeaſes*, where this point is diſcuſſed at length.

But diſeaſes alſo cure each other, or ſuſpend each other's action. It is a fact, in the animal economy, which was particularly pointed out by the late Mr. John Hunter, that certain operations of the ſyſtem are incompatible with certain others: thus, that febrile proceſs of the animal body, which produces the eruption of ſmall-pox, cannot go on at the

the same time with that which brings forth the eruption of measles; so that, if the contagion of these two diseases be received nearly at the same time, the one will lie dormant during the whole progress of the other; and that having been completed, it will then commence, and complete its own course independently; or if one has already begun to appear, it will sometimes disappear during the operation of the other contagion, and re-appear, and go through its stages, on the cessation of the latter. This is generally true with respect to all the febrile contagious diseases, chicken-pox, scarlet-fever, as well as those just mentioned. The cow-pox and the small-pox continue their action together, which implies, that their operation on the system is the same. The general rule, however, that no two morbid actions can take place at the same time, is not altogether without its exceptions. Besides these contagious fevers, various other diseases are occasionally interrupted and suspended by the occurrence of others; mania is sometimes suspended by fever; we have mentioned two instances of diabetes suspended by acute diseases; phthisis pulmonalis is occasionally suspended by a state of pregnancy, &c.

The *proximate* causes of disease are, in fact, the essential morbid conditions of the whole body or its parts, according as the disease is general or local; or, in other words, they imply the disease itself: "præsens morbum facit, sublata tollit, mutata mutat." The speculations of physicians, respecting the proximate causes of disease, have been very various in different ages, according to the prevalent philosophy; a circumstance in which their futility is implied; for the operations of nature are immutable, and theories that are founded on the observation of nature alone, cannot change with the caprice of speculative minds. It has been the misfortune of medicine, that the speculative and mechanical sciences had received a previous cultivation; and hence, that transferring their hypotheses upon these topics to the animal system, physicians have distorted all their views of the natural operations of that system, and therefore have deceived themselves in what they conceive to be an investigation of facts. They set out, in the early ages, with the doctrine of Aristotle, Plato, and Pythagoras, respecting the elements, the temperaments, the harmony of numbers, the power of uneven numbers, &c., hypotheses, which in fact, after the lapse of more than two thousand years, have not lost all their influence with mankind. As the sciences of chemistry, mathematics, and mechanics, successively claimed the attention of the philosophers, before they had learned the necessity of discriminating between facts ascertained by experiment and observation, and their own conjectures and opinions, medicine was darkened and obstructed by the language and hypotheses borrowed from those sciences. To the elements, qualities, concoctions, and crises of the Greeks, commented upon at large by Galen, and adopted by the Arabians, as satisfactory explanations of the essence of all morbid conditions; the salt, sulphur, and mercury, the acids and alkalies, the effervescences, fermentations, and ebullitions, of the chemists succeeded: next the mathematicians waged war against these doctrines, as inapplicable to the explanation of diseases, and undertook to explain them by axioms, and lemmas, problems, theorems, and so on; with which they flourished plausibly enough on paper, but which, it should seem, would avail them little at the side of the sick. Then the doctrines of mechanical relaxation and distention of obstruction, and error loci, of lentor or tenuity of the humours, &c. superseded the opinions of the mathematicians. The physicians of the last century have gradually approached to a more accurate knowledge of the causes of disease, by the cultivation of anatomy, and physiology, by a more close and experimental investigation of the phenomena of health and disease: and that principle in the animal body, the nervous power, or irritability, which was first attended to in the schools of Hoffman and Stahl, has gradually been appreciated, and acknowledged, as the peculiar characteristic of the living body, in the systems of Cullen, Brown, and Darwin, and in the writings of practical physicians. Those physicians, it is true, more especially the two latter, have too hastily generalized the facts, which have been ascertained on this subject, and therefore their hypotheses are sharing the fate of those of their predecessors. See MEDICINE. This is the age of experiment in medicine, rather than of system and hypothesis; but much remains yet to be done, before we can attempt to give a satisfactory account of the proximate causes of diseases in general. Many morbid changes take place, which are not accompanied by any palpable or visible alterations in the structure of parts, but are cognizable by the derangements of the functions only; such are the extreme depression of muscular strength in the onset of fever; the morbid increase of it in some forms of mania; &c. which depend upon some condition of the nervous power, which can only be appreciated by the obvious phenomena that are connected with it.

It is with these phenomena or symptoms alone, therefore, that the physician is required to occupy his attention; and, by means of these external signs, he will be able to discover those varieties of the internal condition of the body, which will guide him safely and usefully in the application of his remedies; although he may be unable to state the essence of diseases, as the natural philosopher is unable to explain the essential nature of gravitation, electricity, or magnetism, but nevertheless satisfactorily traces their laws. An observation of the different morbid phenomena, as they are combined in different forms of disease, constitutes what is technically termed, the DIAGNOSIS, and is necessarily implied in every rational attempt to cure diseases.

One of the most obvious and general distinctions which occurs to the observer of diseases, is that of the two great classes of *acute* and *chronic* disease. *Acute* diseases are those, in which there is a great and sudden perturbation of the vital and natural functions; as frequent pulse, thirst, quick respiration, heat of skin, and the other phenomena of fever; the animal functions also frequently suffering as in delirium, phrensy, &c. They necessarily run through their course, and terminate in death, in recovery, or in some chronic disease, within a short space of time. The various continued, remittent, and exanthematous fevers, as well as the organic inflammations, cynanche, pleurisy, enteritis, &c. are examples of acute diseases. *Chronic* diseases, from χρόνος, *time*, are such as, on the contrary, produce slow and gradual changes in the health; they are not attended with any violent and continued perturbations of the functions, and may go on for months, and even years. They are not connected with fever, properly so called, but are often accompanied by the daily paroxysms of *hectic* fever; which, without violently disturbing the functions, contributes, by the daily repetition of its irritations, to wear out the vital powers. Phthisis pulmonalis, tabes mesenterica, and other forms of decline, dropsies, scurvy, diabetes, &c. are examples of chronic diseases.

Another distinction of diseases, is of those which are *general*, or affect the functions of the body in general, and those which are *local*, or are confined in their effects to some particular part. Perhaps it is not strictly correct to speak of a general disease; if there is a disease in which the whole system is affected at once, it is idiopathic fever; but even in this complaint, it is disputed whether there be not, as in all other

other inftances, fome local diforder, which excites the morbid action in the fyftem at large, by a general fympathy. See Clutterbuck's Effay on Fevers, 1807. For practical purpofes, however, it is proper to diftinguifh thofe morbid appearances, which are connected with fome conftitutional diforder, from thofe which are merely local; becaufe the remedies of the firft muft be applied through the medium of the conftitution at large, by the ftomach, the cutaneous abforbents, &c. to the difeafed parts; while thofe of the laft muft be applied immediately to the parts themfelves. Thus the local cutaneous eruptions, in fyphilis, require the ftate of conftitution to be thoroughly changed by medicine, before they can be cured; thofe of itch, ring-worm, &c. can be removed only by external topical applications; and conftitutional remedies are of no avail.

For the other diftinctions of difeafe, fuch as corporeal and mental, inflammatory, fpafmodic, &c. fee NOSOLOGY, INFLAMMATION, &c.: and for the diagnoftics of the particular denominations of difeafe, fee the generic titles refpectively.

There is another diftinction, which it may, perhaps, appear to be unneceffary to notice, namely, that of *feigned* difeafes, from thofe which are *real*. But deceptions of this kind are conftantly practifed, from various motives, both upon medical practitioners and upon the world at large; in public hofpitals, and other charitable inftitutions, impofitions of this fort are but too commonly attempted. The only means of difcrimination are to be found in the incongruity of the defcriptions, or of the fymptoms which the patient exhibits, with the appearances obferved by the practitioner. Thus, if the functions of the ftomach go on well, if the fleep is good, if the pulfe is calm, and the tongue without fur, it would be obvious in general that no very acute fymptoms could exift, whatever might be the pretended account of the patient's feelings. Under fufpicious circumftances of this nature, in the Royal Infirmary at Edinburgh, Dr. Cullen ufed to inflict the punifhment of a blifter, intimating to the ftudents that his object was to detect a deception. "Applicetur emplaftrum veficatorium," he would fay, "ad eliciendam veritatem;" to draw out *the truth*. Nervous difeafes, particularly hyfterical and convulfive fits, are doubtlefs often feigned, for finifter purpofes: catalepfy, as authors have defcribed it, was believed by Dr. Cullen to be always a feigned difeafe. A curious volume might be formed of the hiftories of deceptions of this kind; and of the difeafes actually inflicted by individuals upon themfelves, for which they have applied for medical aid, in hofpitals, &c. and continued to keep up the diforders, to the great perplexity of their phyficians, till their deceptions were detected by accident. One woman was actually expofed on the table before the ftudents of a large hofpital in London, preparatory to the operation of lithotomy; but by the caution of the furgeon the extraordinary deception was detected; a hard fubftance being difcovered to have been artificially introduced into the vagina.

Numerous and various, however, as are the real diforders, to which the human conftitution is expofed, it is not deftitute of hope, or of the means of a reftoration of health, when difeafe has once invaded it. For it is happily poffeffed of an internal power, which preferves it from the ill effects of many difeafes, and which fpeedily diffolves fome, already begun, and carries others through their courfe more flowly to convalefcence. This power of the animal economy has been denominated the *vis medicatrix naturæ*, and in the theories of fome phyficians has been confidered too much in the light of a rational agent. The term, in fact, merely implies a difpofition in the conftitution to recover from its difeafes: and it muft be obvious, that, if fuch a difpofition did not exift, it would be vain to attempt to cure them by medicine. For all that medicine, of the moft active powers, can effect, is to excite, to direct, and to regulate that difpofition. Medicine has no influence on the dead body; and, ufed contrary to the natural efforts of the conftitution, is of no avail. By the force of this difpofition wounds heal, hæmorrhages are fuppreffed, fractured bones re-unite; and many noxious matters are ejected from the body, by the very morbid actions which themfelves excite; and thus many evils, which were otherwife beyond the reach of art, difappear fpontaneoufly, without any external affiftance. It is, therefore, of the higheft importance to obferve minutely the powers of the conftitution, and the tendency of their operation; that, in the cure of difeafes, we may ftimulate them, when too languid, or, when obvioufly deficient, we may imitate their actions by art. Much of the recent improvements in the medical art confifts in having exploded many of the abfurd interferences with the proceffes of nature in the conftitution; and in many difeafes, efpecially of the febrile kind, when no organ of the body is particularly fuffering, the principal bufinefs of the phyfician is to watch the progrefs of the natural efforts, to prevent all unneceffary interference, and to be active only when the vital organs are likely to fuffer.

The actions of the conftitution, however, are not always to be confided in as falutary; fometimes they are too weak to be ufeful; at other times they are vehement, and exceffive, infomuch that more mifchief is to be apprehended from their continuance, than from the difeafe itfelf. In flight diforders the conftitutional efforts are fufficient to reftore the health: but no phyfician could fafely truft the lues venerea, or inflammations of the vifcera, to the *vires medicatrices naturæ*; for in the former, no falutary effort whatever is made by the conftitution; in the latter, the vehemence of its efforts is pregnant with danger, as they tend the more certainly to gangrene, or to fuppuration, which, in the internal organs, is fcarcely lefs fatal.

It is neceffary, therefore, to be on our guard againft a double error; and neither to neglect the efforts of nature too much, on the one hand, nor to bend to them too religioufly on the other. For it is, obvioufly, fo far from being always expedient to follow her footfteps clofely, that it is often requifite to purfue a contrary march, and to oppofe the exertions of the conftitution by all poffible meafures. Indeed in the profufion of fubftances in exiftence, which have extenfive powers over the human economy, and produce various and moft ftriking changes in its condition, nature appears to fuggeft to man this occafional interference with his conftitution. Thus many caufes of difeafe may be converted, by the fagacity of the phyfician, into the moft ufeful auxiliaries in his art; fince whatever violently ftimulates the animal frame, may be, under one mode of adminiftration, the caufe of death, and, under another, the beft remedy. Such are, in fact, the powers of the moft valuable medicines, as opium, mercury, the mineral acids, &c.

Experience, then, guided by a knowledge of the caufes and tendencies of difeafe, muft teach us when to look on as quiet fpectators, when to aid, and when to reftrain the morbid efforts of the conftitution. The phyfician, therefore, who with this knowledge and experience combines an acquaintance with the properties and effects of medicines, will feldom be perplexed in determining upon effectual meafures of relief, againft the various difeafes that may occur. The mode of fulfilling his views, in the ufe and choice of remedies, conftitutes the art of THERAPEUTICS; which fee.

Many writers of underftanding have affected to defpife the art of curing difeafes, confidering it as built entirely

upon conjecture, unfupported by thofe inductions from well afcertained facts, on which the phyfical fciences reft; and confequently as guided by no better rules than thofe which the caprice or fhrewd gueffes of individuals may have fuggefted. And fome phyficians, it muft be acknowledged, have given caufe for fuch opinions, in all ages, by the abfurdity of their hypothefes; while others, by the folemn myftery with which they have attempted to cloak their ignorance, or to give an air of importance to the profeffion, have excited a fufpicion that concealment was neceffary for the fuccefs of a craft, which would be contemned for its imbecility, if expofed. But this myftery is deprecated by all rational phyficians. The truth is, that the phenomena of the animal economy are as regular and immutable as the other phenomena of nature; and confequently are as open to obfervation, and as capable of generalization and arrangement; that is, of being reduced to a fcience, as the other departments of natural knowledge. The facts, indeed, have not as yet been fufficiently noted, to enable us to form a perfect theory; as is likewife the cafe with the chemical, electrical, and magnetical fciences. Much yet remains to be done, but much alfo has been done, in all thofe fciences, and in medicine, among the reft, in the courfe of the paft century. The fyftem of abforbent veffels, of fo much importance in the animal economy, has been difcovered; a nearer approximation to the knowledge of the procefs of refpiration, and the changes of the blood in its courfe, has been made by the aid of chemiftry; the phenomena of irritability have been the fubject of fuccefsful examination, to a great extent, and many of its laws afcertained, both in health and difeafe; the effects of many powerful agents on the animal body have been difcovered experimentally, and many general conclufions refpecting them obtained, fuch as thofe of cold, of heat, of contagion, and fome active remedies, arfenic, mercury, &c. have been more amply appreciated, within the period juft mentioned. The fcience of medicine, therefore, like other branches of natural knowledge, is in a courfe of advancement, and that upon the fame fure grounds of obfervation and experience. The hiftory of difeafes will alfo afford ample evidence of the progrefs of this improvement. The contagious difeafes of the old world are greatly diminifhed in their extent and fatality. Of the plague we know little more than hiftory teaches us: the fcarlet fever, which, under a hundred denominations, was the fcourge of Europe for feveral centuries, is now comparatively rendered harmlefs. (See Willan on Cutan. Difeafes. part iii.) The fmall-pox has been ameliorated by inoculation and cool treatment, and now appears likely to be exterminated by the difcovery of the cow-pox. And many other individual difeafes may be enumerated, of which the fatality has been greatly diminifhed.

In fhort, as facts accumulate, the fcience advances towards certainty and perfection. The circumftances which influence difeafe in the animal economy are numerous; their combinations, perhaps, innumerable; fo that the fcience of life is neceffarily more complicated than that of dead matter; but the principles on which they both are founded are the fame, *viz.* fact afcertained by experiment. The variety and complication of the phenomena of health and difeafe point out, in the moft irrefragable manner, the neceffity of various applications, in the way of remedy, and the confequent abfurdity of the expectation that any one remedy can be effectual in the cure of all, or of many difeafes. Nothing, therefore, except the effrontery of empirics, can equal their error and falfehood, in the affurances of the general virtues of the remedies which they promulgate.

The power of the mind over the difeafes of the body is very confiderable; infomuch that very ftrong impreffions, excited in the former, will often remove the diforders of the latter; efpecially impreffions of hope and confidence. This power was ftrongly illuftrated in the influence of the profeffors of animal magnetifm, and more lately in the ufe of the tractors of Perkins in the cure of many flight difeafes. There can be little doubt that this principle influences the effect of remedies, under the beft adminiftration, and aids their curative operation. (See Dr. Haygarth's pamphlet on the influence of imagination in the cure of Difeafes. See alfo Dr. Franklin's report of the French commiffioners, appointed to inveftigate animal magnetifm.) Hence, there can be little doubt, that many remedies have obtained the reputation of efficacy in the cure of difeafes, which, in confequence of the confidence of the patient in their virtues, or fome other impreffion on the mind, have been followed by a recovery of health, in the procuring of which they had phyfically no influence.

The reader will find the indications of cure, and the remedies, which experience has fuggefted for the fulfilment of thofe indications in the various forms of difeafe, under the titles of thofe difeafes refpectively. See Gregory Confpect. Med. Theoret. tom. i.

DISEASES *of Plants*, in *Vegetation*, are fuch affections as take place in vegetables from fome derangement in the actions or functions either of the whole, or fome particular part of them. They proceed from a great variety of different caufes, and have very different appearances as they affect the wood, the bark, or the leaves of the plants. Thefe difeafes may, perhaps, be confidered, in moft cafes, as proceeding from internal decay, a morbid ftate of the circulating fluids, blights, lightning, and the attacks of animals of the infect kind.

But as particular trees and plants are liable to be affected by particular difeafes, their caufes, nature, and means of removal, will be more properly treated of under the names by which they are ufually denominated, and after defcribing the plants. See PLANTS, *difeafes of*.

DISEL, in *Geography*, a town of Perfia, in the province of Khorafan; 18 miles S. E. of Herat.

DISEMBARK, fignifies to land goods from on fhipboard.

DISEMBODY. See EMBODY.

DISEMBOGUE. When a fhip paffes out of the mouth of fome great gulf or bay, they call it difemboguing. They fay, alfo, of a river, that at fuch a place, or after it has run fo many leagues, it difembogues itfelf into the fea.

DISENTIS, or DISSENTIS, in *Geography*, a fmall town of Switzerland, in the canton of the Grifons, fituated in a mountainous but fertile diftrict, irrigated by two fources of the Rhine, and remarkable for a rich abbey, which is faid to have been founded in the feventh century, and of which St. Sigifbertus is reported to have been the firft abbot from the year 1614 to 1636. It is fituated between Tavetfch and Trons. The abbot of Difentis, Peter of Pietlingen, was one of the three patriots who firft fwore allegiance to the Helvetic confederacy under the lime tree at Trons.

DISERGOT, in the *Manege*. See ERGOT.

DISFIGURING, in *Law*. See MAYHEM.

DISFRANCHISING, the taking away one's freedom, or privilege. See FRANCHISE.

DISGORGE, in the *Manege*, is ufed for difcuffing or difperfing an inflammation or fwelling: thus, if a horfe's legs are gorged or fwelled, we fay he muft be walked out to difgorge them.

DISGRACE, in a *Military Senfe*, has various modifications; from abfolute infamy to fimple reprimand; it is alfo variable in its extent according to the rank of the perfon to whom

whom reprehenſion may be given; thus, what would be but a ſlight reprimand to a young officer, would, if uſed towards a veteran, who ſhould be ſuppoſed to underſtand the whole of his duty, and to act on all occaſions with the ſtricteſt propriety, be a ſevere cenſure, and tend to degrade him in the minds of his equals. The term diſgrace is, however, generally applied to the puniſhment inflicted by a court martial; eſpecially when the ſentence is to be carried into effect upon an officer in a public manner; ſuch as reading the deciſion of the court on a parade in front of a body of troops; though it is more uſual to diſpenſe with the attendance of the party, unleſs in caſes of cowardice, and ſuch ignoble conduct as demands the moſt exemplary puniſhment. The policy of debaſing the ſubordinates from witneſſing the expulſion of an officer is certainly proper; hence we conſider the ordinary mode of deputing a perſon to deliver the ſentence to the offender, to be highly politic and commendable.

But where the court have reſolved to break an officer in the moſt ſevere manner, which is always implied under the terms of "breaking with infamy," the foregoing diſpenſation cannot with propriety be indulged in. The party, on ſuch occaſions, muſt be brought to the parade; when the ſentence having been publicly announced, and his majeſty's approval declared, the officer, who is immediately inſtrumental in carrying the ſentence into execution, breaks the culprit's ſword over his head, and after cutting his ſaſh into pieces, tramples them under foot, and conducts the party beyond the limits of the camp or garriſon. In ſome ſervices the ceremony is performed under a gibbet, but more eſpecially when the court have ſentenced the offender to death, and that the ſovereign commutes the puniſhment to breaking with infamy.

It, however, is to be obſerved, that no officer, or ſoldier, can be broke *with infamy* except by the deciſion of a competent court; and the impoſing ſuch a puniſhment upon any man, in lieu of any other, even of death, is obviouſly againſt the ſtatute, becauſe a perſon broke with infamy is incompetent to become a witneſs in any cauſe; whereas one convicted of any crime whatever, provided he obtain the king's pardon, is reſtored to his credit, and may be adduced as a teſtimony in any court, civil or military; at leaſt ſuch are the opinions of our beſt law authorities, ſuch as Hawkins, Holt, and Hale, who all admitted a pardoned felon to give evidence, while they invariably rejected ſuch as had ſtood in the pillory, or had been publicly whipped, or who had been branded by the ſentence of any court having juriſdiction competent to inflict ſuch puniſhments.

It therefore behoves every perſon in authority, eſpecially military men, who are not always ſufficient judges of the law, to be very careful how they commute puniſhments; at leaſt without conſent of the party; but even that might not ſave them from damages in a civil court, ſince the fear of death, &c. might be urged in plea for an aſſent, and be found a ſufficient ground for proſecution.

Diſgracing a regiment is, eraſing its number from the military calendar: this has on various occaſions been done, the corps being firſt broken and its colours burnt.

A ſoldier is held to be *in diſgrace*, who is obliged, for any ſpecified number of days, to wear his coat the wrong ſide outwards, ſo as to diſtinguiſh him from the deſerving part of the regiment. We regret much that ſuch means are not more generally reſorted to, for the puniſhment of ſlight offences: from what we can collect, many very important reformations have been effected by attacking the pride, rather *than the backs of the ſoldiery*.

DISGUISE. Perſons doing unlawful acts in diſguiſe, are, by our ſtatutes, ſometimes ſubjected to great penalties, and even declared felons. Thus, perſons convicted of hunting in diſguiſe, in foreſts, parks, or warrens, or of unlawful hunting in the night, are to ſuffer as felons. But the principal act of parliament, in this reſpect, is that commonly called the *Black Act*, which ſee.

DISH, in *Mining*, is a trough made of wood, about twenty-eight inches long, four inches deep, and ſix inches wide; by which all miners meaſure their ore. If any be taken ſelling their ore, not firſt meaſuring it by the barmaſter's diſh, and paying the king's duties, the ſeller forfeits his ore, and the buyer forfeits, for every ſuch offence, forty ſhillings to the lord of the field, or farmer. See Mining.

DISHERISON, an old word of the ſame import as diſinheriting. Our lord the king, conſidering his own damage, and diſheriſon of the crown, &c. Stat. 20 Ed. I. 8 Richard II.

DISHERITOR, a perſon who diſherits, or puts another out of his inheritance. The ſheriff ſhall, forthwith, be puniſhed as a diſheritor of our lord the king, and his crown. Stat. 3 Edw. I. c. 39.

DISHNE, in *Geography*, a town of Egypt; 16 miles N.E. of Menuf.

DISIMIEU, a ſmall town of France, in the department of the Iſere; 3 miles S.E. of Cremieu.

DISINTEGRATION, in *Geology*, implies the ſeparation of the integrant parts of mountains and ſtrata, by the viciſſitudes of the atmoſphere, the abſorption and congelation of water in conſequence of the ſudden dilatations and contractions thereby produced, &c.; by means of diſintegration, the primitive mountains are ſuppoſed by ſome to have been ſo far lowered, degraded, and decompoſed, as to have furniſhed matter for the ſubſequent formation of what they call the ſecondary ſtrata: this opinion ſeems, however, to be faſt giving way, and the Deposition *of Strata*, (ſee that article) to be accounted for, on principles ſimilar to thoſe which operated in the formation of the ſubſtances called primitive.

DISJUNCT Proportion. See Discrete *Proportion*.

DISJUNCTIVE denotes ſomething that ſeparates or disjoins. Thus, disjunctive conjunctions ſignify a ſpecies of words which bear this contradictory name, becauſe, while they disjoin the ſenſe, they conjoin the ſentences; or, whilſt they connect a diſcourſe, they ſeparate its parts; or, they are ſuch as denote the relations of diverſity, or oppoſition. Of theſe disjunctives, ſome are ſimple, and ſome adverſative; for an account of which, ſee Adversative and Conjunction.

Disjunctive *Propoſitions*, in *Logic*, are compound propoſitions, conſiſting of two members, or parts, connected by a disjunctive conjunction.

The firſt propoſition of a dilemma is uſually a disjunctive propoſition.

"You muſt either obey the king, or be a rebel.
But you muſt not be a rebel.
Therefore you muſt obey the king."

DISK. See Disc and Discus.

Disk, in *Botany*, the central part of a compound, or ſyngeneſious flower, oppoſed to the marginal, or radiant part. The diſk is either flat, as in the Ox-eye, or *Chryſanthemum*, or conical, as in the Daiſy. Its colour is almoſt univerſally yellow; ſometimes white, as in *Achillea*, in which caſe, the radius alſo is white, or reddiſh. "No inſtance is known of yellow rays with a white, red, or blue diſk." Sm. Introd. to Botany, 308.

Difk is alfo ufed for the middle part of the upper furface of a leaf, exclufive of all lobes, fegments, or indentations.

DISKO Bay, in *Geography*, a large bay of Greenland, feparating the main land from the ifland of Difko; in which bay there is a multitude of fmall iflands, the principal being the Weft, Whale, Green, Dog, and Dunk iflands. Some of thefe are extended eaftwards as far as Spiring bay, and fome northwards to Difko ifland. N. lat. 68°—70°. W. long. about 45° 46′. The whole bay is about 160 leagues in circumference. The land is high, flat above, and covered with ice. Beneath, near the fhips' road, the country is flat and level. The Dutch maps intimate, that on a place they call Schaus, good coals have been found, but they were never ufed. On this ifland are many rein-deer, which are found on no other ifland. The water between this and the firm land is called Waigat, and is fix leagues broad. The fifhery in the bay is the beft in the whole country; in the winter, when the water of the bay is frozen, the Greenlanders take a multitude of feals on the ice, and in the fpring they catch fmall whales, and fometimes large ones. Many Dutch whale fifhers have formerly been accuftomed to vifit this place every year. Difko bay is the moft populous place on the coaft, except thofe parts fartheft to the fouth, where no colonies have been eftablifhed. Difko is alfo the beft place for trade. Several colonies were eftablifhed by the Moravian miffionaries, in the vicinity of this bay, from the year 1734, to the year 1758. The Greenlanders of Difko fay, that the country is inhabited for 209 leagues upward, that is, as far as the 78th degree, but very thinly; for though there is plenty of eider-fowls, white bears, feals, and whales, yet no perfon wifhed to live there for a long time, on account of the tedious melancholy winter nights. They alfo were in want of food and iron, which they procured in barter from the Southlanders for unicorn-horn. The land was nothing but dreary rock and ice, and did not produce fo much grafs as they ufed in their fhoes, and, therefore, they were under a neceffity of bartering alfo for grafs. Inftead of making their houfes with wood-work and turf, they make them with the horn of unicorn-fifh, clay, and feal-fkins. The land is faid to ftretch N.W., towards America, and is fenced with many iflands. Here and there, it is faid, there are ftones ftanding erect, with arms extended, like the guide-pofts in our country. Fear has fuggefted to the inhabitants, that there ftands a great "Kablunak," or European, on a certain hill, to whom they offer a piece of whale-bone when they pafs by. A miffionary reports, that in Difko bay, on a point which the whale-fifhers fay is 300 fathom deep, feveral ice mountains have ftood faft for many years; one of which they call the city of Harlem, and another, Amfterdam. Sometimes they faften their fhips to them, and unload their train-barrels on the flat ice. Crantz's Hift. of Greenland, vol. i.

DISLOCATION, in *Geology*, fignifies the difplacements of the parts of mountains, and the pieces of the ftrata of the earth, from the fituation which the fame once occupied, when in contact with each other. The fiffures, faults, flips, dykes, troubles, hitches, traps, rifts, breaks, loads, veins, knots, &c. which occafion thefe diflocations, are evident fractures of the matters compofing the cruft of the earth, after the fame had affumed a folid form, and their edges, in moft inftances, prefent evidence of the moft violent mechanical action, and rubbing againft each other (Philofophical Magazine, xxviii. p. 120.) indicating their having frequently flid, or ground againft each other, even where no alteration in the level of the diflocated parts of the ftrata are now obfervable. See Continent, Denudation, &c.

DISLOCATION, in *Surgery*. See Luxation.

DISMAL, in *Geography*, a fwamp of N. America, in the townfhip of Milton, Lincoln county, Maine.

Dismal *Swamp*, called the "Great Difmal," in order to diftinguifh it from another fwamp called Difmal, in Currituck county, is a very large bog, extending from N. to S. near 30 miles, and from E. to W. at a medium, about 10 miles; partly in Virginia, and partly in N. Carolina. Five navigable rivers, befides creeks, rife from it; two run into Virginia, *viz.* the S. branch of Elizabeth, and S. branch of Nanfemond river; and three into N. Carolina, *viz.* North river, North-weft river, and Perquimons. The heads of thefe rivers lie concealed in the Difmal, as no figns of them appear above ground, and therefore the fwamp from which they originate muft be amply fupplied either from fubterraneous ftores, or by the water that drains into it from the high lands. The fkirts of the fwamp towards the N. E. are overgrown with reeds, 10 or 12 feet high, interfperfed every where with bamboo briars. Among thefe grows here and there a cyprefs, or a white cedar. Towards the S. end is a large tract of reeds, which being conftantly green and waving in the wind, is called the green fea. In many parts, efpecially on the borders, is found, in abundance, an ever-green fhrub, called the gall-bufh, from its bearing a berry, which dyes a black colour like the gall of an oak. No beaft, bird, reptile, or infect, approaches this horrible defert. The noxious vapours that afcend from it infect the air about it, and occafion agues and other diftempers to the neighbouring inhabitants. This dreadful fwamp was judged impaffable, till the line, dividing Virginia from N. Carolina, was carried through it, in N. lat. 36° 28′, in the year 1728, by order of king George II.; the men employed were not without apprehenfions of being ftarved, as they were ten days in accomplifhing the work. This fwamp is chiefly owned by two companies, *viz.* the Virginia company, of which Gen. Wafhington was one, owning 100,000 acres, and the N. Carolina company, which owns 40,000 acres. In the midft of the fwamp is a lake, about feven miles long, called "Drummond's pond," whofe waters difcharge themfelves into Pafquotank river, that empties into Albemarle found, and on the north into Elizabeth and Nanfemond rivers, which fall into James river. A navigable canal is forming in order to connect the navigable water of Pafquotank and Elizabeth river, through a diftance of about 14 miles. This canal will open an inland navigation from the head of Chefapeak bay, including all the rivers in Virginia, to George-town in S. Carolina; and when the fhort canal from Elk river to Chriftiana creek is opened, the communication will extend to Philadelphia and the other parts connected with Delaware river. Morfe.

DISMASTED, in *Sea Language*, denotes the ftate of a fhip, when fhe has loft her mafts by engagement or bad weather.

DISMEMBERED, in *Heraldry*, is applied to birds that have neither feet nor legs; as alfo to lions and other animals, whofe members are feparated. See Membered.

DISMES, *Decimæ*, in our *Law Books*, tithes. See Tithe.

DISMISS, in a *Military Senfe*, relates to the difcharge of an officer from the king's fervice. This is occafionally rendered highly difgraceful, as well as injurious in a pecuniary fenfe, by a prohibition againft the party being re-admitted to any military fituation; in fuch cafe the fentence ordinarily runs, "to be difmiffed and rendered incapable of ferving his majefty in any *military* capacity." This diftinction has been rendered highly neceffary, on account of the circumftances which attended the late lord George Sackville, whofe admiffion into the houfe of peers, and efpecially into his majefty's privy council, was ftrongly oppofed, becaufe

caufe he had been difmiffed by a court martial, which adjudged him to be difqualified from being again employed by his majefty. It requires but little confideration to decide the foregoing queftion; the fenfe of the court was obvioufly founded on his lordfhip's conduct as a foldier; and could neither difqualify him as a counfellor, nor as a peer. Befides, his reftoration to the king's favour, was, in itfelf, tantamount to a pardon.

Dismiss, is alfo a word of command occafionally given to troops on a parade, when it is intended they fhould retire to their barracks, &c.

DISMISSION *of a bill*, in *Chancery*. If the plaintiff does not attend on the day fixed for the hearing, his bill is difmiffed with cofts. It may alfo be difmiffed for want of profecution, which is in the nature of a NON-SUIT at law, if he fuffers three terms to elapfe without moving forward in the caufe.

DISMOUNTING, in the *Military Art*, the act of unhorfing. Thus, to difmount the cavalry, the dragoons, or the like, is to make them alight.

To Dismount *the cannon*, is to break their carriages, wheels, and axle-trees, fo as to render them unfit for fervice.

Horfes are alfo difmounted when they are rendered unfit for fervice.

DISNEY, John, in *Biography*, was born at Lincoln in the year 1677. At the grammar fchool in that city he received the early part of his education, and afterwards ftudied at a private academy among the Diffenters, to whom his father was attached. He was next entered at the Middle Temple with a view of making himfelf fo far acquainted with the law as to enable him to become refpectable as a magiftrate and an author. The former character he fuftained with dignity and much reputation: he was diligent, difinterefted, and impartial in his decifions: he took an active part with thofe who formed themfelves into a fociety for the fuppreffion of vice and immorality. His regard to duty gained him the refpect of the wife and good, and on fome occafions he was fingled out as meriting the thanks of the judges of the circuit for fervices that he had rendered his country. As he advanced in life, and after he had acted as a magiftrate more than 20 years, he conceived the defign of becoming a minifter in the church of England, with which he had communicated from the time that he had attained to manhood. He was firft ordained a deacon, and afterwards in 1719 a prieft. In the fame year he was prefented with the vicarage of Croft, and to the rectory of Kirby-fuper-Baine, both in his native county. In the year 1722, he was inftituted to the vicarage of St. Mary in Nottingham, to which town he removed; and here he remained till his death in the year 1729-30. As a clergyman he was remarkably attentive to the duties of his profeffion, and his own conduct was in complete unifon with the precepts which he delivered as the rule of life: he was admired as a preacher; refpected and beloved as a man. He publifhed many works; and left behind him ftill more in MS.; of thefe we have a full account in the Biographia Britannica, to which our readers muft be referred for more particulars relating to this excellent man. Biog. Brit.

DISNIA, or Dissima, in *Geography*, an ifland or peninfula of Japan, on a rock of which the Dutch had formerly their factory, and from which they carried on a confiderable trade.

It is feparated from the city of Nanguazak only by a river and a wall, which divides the traders from all communication with the town. The ifland is about two miles in compafs; and no Dutchman was allowed to ftir out of it, during the whole time of his ftay, or about nine months in the year, without danger of being cut to pieces by the guards, which were fet over them, and guarded the bridge over the river that parted them from the city. They were not permitted to converfe either with the guards, or with any natives, except fuch as were appointed by the governor as factors, brokers, or to fome other fuch office. They were not fuffered to have a lighted candle in their houfes, any more than on fhip board; and if the centinels heard any uncommon noife, or perceived any difturbance among them, they gave immediate notice of it by blowing a horn; upon which a party was difpatched by the governor, with an officer at their head, to inquire into the occafion of it, and either punifh, or, at leaft, feverely threaten the offenders. During the fix weeks of open trade, great numbers of Japanefe came into the ifland, and put up their rich booths, furnifhed with all manner of merchandize. They amufed themfelves with gaming, drinking, and converfing with handfome young women procured from the Bayos, or Japanefe lords, who thought it no difgrace to their dignity to trade with ftrangers in that fort of commodity.

DISORDERLY Houses. See Nusance.

Disorderly *Perfons*. See Vagabonds.

DISORIENTATED, from *dis*, and *oriens*, eaft, a term applied to a thing that is turned, or removed from the eaft, to which it was originally directed.

But the word is moft frequently ufed in a figurative fenfe, for the difconcerting, or putting a man out of his way or element.

Andrew Marvel ufes the word difoccidentated inftead of diforiestated: Geneva had difoccidentated our geographer.

DISPARAGEMENT, in *Law*, was ufed, in the old tenures, for the matching an heir, &c. in marriage, below his or her degree or condition; or againft the rules of decency.

The word is a compound of the privative particle *dis*, and *par*, *equal*.

DISPART, in *Gunnery*, is ufed for fetting a mark on the muzzle-ring of a piece of ordnance; fo that a fight-line, taken upon the top of the bafe ring againft the touch-hole, by the mark fet on or near the muzzle, may be parallel to the axis of the concave cylinder. The common way of doing which, is, to take the two diameters of the bafe ring, and of the place where the difpart is to ftand, and divide the difference between them into two equal parts, one of which will be the length of the difpart, which is fet on the gun with wax or pitch, or faftened there with a piece of twine or marlin: but an inftrument may be made to do it to all poffible nicety. See *Line of* Direction.

Dispart *Frontlet*. See Frontlet.

DISPATCH, (from the French *dépêche*, which induced Johnfon to write it defpatch.) is a letter on important ftate affairs, fent with particular care and expedition by a truft-worthy perfon, appointed for that fpecial purpofe. The perfons generally appointed to be the bearers of difpatches in England are called king's meffengers; in France and Germany, couriers. But when a letter of particular importance is confided in Germany to a poftillion of the poft-office, or to any fpecial meffenger fent exprefs on horfeback, fuch a perfon is called an eftafette, corruptly eine ftafette, in Englifh an exprefs.

DISPAUPER. When any perfon by reafon of his poverty, is admitted to fue in *forma pauperis*; if afterwards, before the fuit be ended, the fame party have any land or perfonal eftate fall to him, or that the court, wherein his fuit is depending, think fit for that, or fome other reafon, to

to take away the privilege from him, he is then faid to be difpaupered. See Costs.

DISPENSARY, an inftitution for the relief of the fick poor with medical advice and neceffary drugs, &c.; about twenty of which are eftablifhed in London, and fupported by voluntary contributions. One or more phyficians and furgeons attend daily at each difpenfary, and prefcribe for the medicines, which are diftributed gratuitoufly; and afterwards, thofe patients who cannot meet the medical attendants at the inftitution are *vifited* by them at their own habitations. In the latter refpect, it is obvious, that a well conducted difpenfary has the advantage over an hofpital of adminiftering comfort and relief to poor families, without mingling them with difeafed and dying ftrangers, or feparating them from their neareft relatives. But, as there are numerous cafes of individuals too poor to maintain themfelves during ficknefs, or who are in a ftate to need fome chirurgical operation which cannot well be done at home, the practice of a difpenfary muft, in fuch inftances, give place to the accommodations of an hofpital. (See Hospital.) In fome difpenfaries three thoufand patients are relieved annually; fo that, probably, not fewer than 40.000 poor perfons receive the benefit of thofe humane eftablifhments every year in London alone!

Three difpenfaries have been inftituted by the college of phyficians, the firft of them in 1696, for the purpofe of *vending* at prime coft the medicines which were prefcribed for the fick-poor; but they have been long fince abolifhed, and, indeed, are not now wanted, as medicines are furnifhed *gratis* at other difpenfaries more recently eftablifhed. When we recollect, that, befides thefe charitable inftitutions, there are not lefs than twelve large hofpitals in this metropolis, for the reception of the fick and maimed, moft of which are fupported by voluntary fubfcriptions; we cannot contemplate fo much beneficence and fellow-feeling, without admiring the noble effects produced by the *Proteftant* religion, and which are not found to the fame extent in any other country.

DISPENSATION, in *Law, &c.* a permiffion to do fomething contrary to the ftanding laws; or a relaxation, or fufpenfion of a law, on fome juft occafion.

Some confound difpenfation with equity; but they are very different things; for equity is only the correction, or modification, of a law which is too general; but a difpenfation fufpends the obligation of the law itfelf, and can, therefore, be only given by the legiflative power.

The king of France ufed to grant difpenfations of age to fome officers, to be admitted before the legal age: but the greateft dealer in difpenfations is the pope, who claims the office, *jure divino*, and extends it to every thing: indeed, the more fober of the Romanifts themfelves deny that he can give a difpenfation for a thing contrary either to the divine law, or the law of nature, and confine him to what is contrary to pofitive laws, as to things relating to fafts, marriages, holding feveral benefices, &c. And even in thefe things they fet bounds: thus, fay they, a difpenfation in the firft degree of affinity, as that of father and daughter, brother and fifter, would be abufive and null. But it is certain the papal fee does not apprehend itfelf under any fuch fevere reftrictions.

The right of giving difpenfations they thus prove. It is certain the church has power to make laws: a power which the apoftles themfelves exercifed, and which their fucceffors have continued to exercife after them. Whoever can make a law, can annul it; and much more, can he difpenfe with it in certain cafes: the church, then, may difpenfe with the laws itfelf has made, and we find it to have done accordingly in all ages. See Præmunire.

The archbifhop of Canterbury has a power, by ftat. 25 Hen. VIII. c. 21. of difpenfing in any cafe, within the realm, wherein difpenfations, not contrary to the law of God, were formerly granted by the fee of Rome, as well to the king as to his fubjects: but in extraordinary matters, or in a cafe that is new, the king and council are to be confulted; and the difpenfation muft be confirmed under the broad feal: and during the vacancy of the archbifhop's fee, the guardian of the fpiritualities may grant difpenfations. Every bifhop, of common right, has the power of difpenfing in common cafes.

Dispensations *for pluralities*. See Chaplain and Plurality.

Dispensation *of the king*, makes a thing prohibited lawful to be done by the perfon that has it, though a thing evil in itfelf will not admit of a difpenfation. When an offence wrongs none but the king, or if the fuit is only the king's for the breach of a penal law, that is, not to the damage of a third perfon, the king may difpenfe: but in cafe the fuit is the king's, for the benefit of another, he cannot. It was formerly held, that the king might in many cafes difpenfe with penal ftatutes, and the exercife of this difpenfing power was one of the moft ignominious badges of flavery and engines of tyranny, which ever difgraced and haraffed this country. The claim and exercife of it are very ancient in England; and though it feems firft to have been copied from papal ufurpations, it may be traced up as high as the reign of Henry III. The practice of difpenfing with penal ftatutes had fo much prevailed, that parliament itfelf had more than once acknowledged this prerogative of the crown; particularly during the reign of Henry V., when they enacted the law againft aliens, and alfo when they paffed the ftatute of provifors. (Rot. Parl. 1 Hen. V.) However, in the reign of Richard II., the parliament granted the king only a temporary power of difpenfing with the ftatute of provifors (Rot. Parl. 15 Rich. II.); a plain implication, fays Mr. Hume, that he had not of himfelf fuch a prerogative. In the 23d of Henry VI. a claufe was inferted in a ftatute, by which the king was difabled from granting a difpenfation for a fheriff's ferving more than a year. Neverthelefs the difpenfing power prevailed in other cafes; and it was foon able, aided by the fervility of the courts of judicature, even to overpower this ftatute, which the legiflature had evidently intended to fecure againft violation. In the reign of Henry VII. the cafe was brought to a trial before all the judges in the exchequer-chamber; and it was decreed that, notwithftanding the ftrict claufe above-mentioned, the king might difpenfe with the ftatute. Many other difpenfations of a like nature may be produced; not only fuch as took place by intervals, but fuch as were uniformly continued. In the 2d of James I., a new confultation of all the judges was held upon a like queftion; and this prerogative of the crown was again unanimoufly affirmed. (Coke's Rep. 7.) And it became an eftablifhed principle in Englifh jurifprudence, that though the king could not allow of what was morally unlawful, he could permit what was only prohibited by pofitive ftatute. Even the jealous houfe of commons, fays Hume, which extorted the petition of right from Charles I., made no fcruple, by the mouth of Glanville, their manager, to allow of the difpenfing power in its full extent; and in the famous trial of fhip-money, Holborne, the popular lawyer, had freely, and in the moft explicit terms, made the fame conceffion. Sir Edward Coke, the great oracle of Englifh law, had not only concurred

with

with all other lawyers in favour of this prerogative; but ſeems even to believe it ſo inherent in the crown, that an act of parliament itſelf could not aboliſh it. (Rep. 12.) And he particularly obſerved, that no law can impoſe ſuch a diſability of enjoying offices as the king may not diſpenſe with, becauſe the king, from the law of nature, has a right to the ſervice of all his ſubjects. This diſpenſing power was exerciſed by Charles II. in his declaration of indulgence to diſſenters in 1672, but in the following year it was diſapproved and condemned by the houſe of commons. The diſſenters joined with other members of the houſe in diſavowing it, though it had been exerciſed in their favour. Alderman Love, member for the city of London, declared, "that he had rather go without his own deſired liberty, than have it in a way ſo deſtructive of the liberties of his country, and the proteſtant intereſt; and that this was the ſenſe of the main body of diſſenters:" at length the king recalled his declaration. King James II. diſpoſed to ſhew favour to the papiſts, and finding it impracticable to obtain a legal toleration in the circumſtances of the nation, in the year 1686, determined to attempt it by the diſpenſing power. On this occaſion many pamphlets were diſperſed in favour of liberty of conſcience; and ſir Roger l'Eſtrange, with many other mercenary writers, were employed to maintain, that a power in the king, to diſpenſe with the laws, is law. Moreover, it was reſolved, to have the determination of the judges on this queſtion: and they all (except one) gave it as their opinion, 1. "That the laws of England were the king's laws. 2. That it is an inſeparable branch of the prerogative of the kings of England, as of all other ſovereign princes, to diſpenſe with all penal laws in particular caſes, and on particular occaſions. 3. That of theſe reaſons and neceſſity the king is ſole judge. 4. That this is not a truſt now inveſted in, and granted to the preſent king, but the ancient remains of the ſovereign power of the kings of England, which was never yet taken from them, nor can be." Accordingly, a diſpenſation, or licence office, was ſet up, where all who applied might have an indulgence, paying only fifty ſhillings, for themſelves and their families. Many non-conformiſts, now careſſed by the court for very obvious reaſons, who had been proſecuted for conventicles, took out theſe licences, which not only ſtopped all proceſſes that had been commenced, but gave them liberty to go publicly to meetings for the future. Whatever topics lawyers might find to defend James's diſpenſing power, the nation thought it dangerous, if not fatal, to liberty; and his reſolution of exerciſing it may, on that account, be eſteemed no leſs alarming, than if the power had been founded on the moſt recent and flagrant uſurpation. However, he was determined to perſevere; nor was he deterred by the reflection, that this ſcheme of indulgence had already failed in the preceding reign, and that in ſuch a government, as that of England, it was not ſufficient that a prerogative be approved of by ſome lawyers and antiquaries: if it was condemned by the general voice of the nation, and yet was ſtill exerted, the victory over national liberty was no leſs ſignal than if obtained by the moſt flagrant injuſtice and uſurpation. Nevertheleſs in the following year, *viz.* 1687, he iſſued his declaration for liberty of conſcience; and announced it to be his intention, from time to time, to grant his royal diſpenſation to all his ſubjects to be employed in any office, or place of truſt, either civil or military, under his government. A ſimilar declaration was ſent to Scotland. Some diſſenters of the ſeveral denominations, who were now admitted to ſerve in all offices of profit and truſt, were thankful for their liberty, and concurred with others in addreſſing his majeſty in higher ſtrains than ſome of their elder and more cautious miniſters approved. Many of the moſt reſpectable refuſed to join in them; and biſhop Burnet admits, that few concurred in theſe addreſſes: and that the perſons who preſented them were mean and inconſiderable. The diſſenters, in general, both dreaded and deteſted the diſpenſing power, whatever preſent benefit might redound from it to themſelves. Means were uſed for electing a parliament which would ſanction the king's declaration of indulgence, and cauſe it to paſs into a law; but amongſt many others, who were indiſpoſed to concur in the court meaſures, the diſſenters, though they had been peculiarly favoured, manifeſted either total indifference or averſion. Concerned for the proteſtant religion, and dreading the effects of the king's bigotted attachment to popery, they choſe to truſt their liberty to the mercy of their proteſtant brethren, rather than receive a legal ſecurity of it under a popiſh government. Their conduct diſobliged the king to a very high degree, and he ſaid, that "the diſſenters were an ill-natured ſort of people that could not be gained."

The king, finding little hopes of ſucceſs, delayed the ſummoning of a parliament, and proceeded ſtill in the exerciſe of his *illegal* and arbitrary authority. In 1688, he publiſhed a ſecond declaration of indulgence, almoſt in the ſame terms with the former; and he ſubjoined an order that, immediately after divine ſervice, it ſhould be read by the clergy in all the churches. The clergy determined not to comply with the royal mandate; and in order to encourage them in this reſolution, ſix prelates concerted the form of a petition to the king, in which, amongſt other things, they repreſented, that, as the declaration of indulgence was founded on a prerogative, formerly declared illegal by parliament, they could not, in prudence, honour, or conſcience, ſo far make themſelves parties, as the diſtribution of it all over the kingdom would be interpreted to amount to. They therefore beſought the king, that he would not inſiſt upon their reading the declaration. The conſequence is well known. The biſhops were ſummoned before the council and committed to the Tower. It is beſides our purpoſe in this place to give in detail thoſe farther violent proceedings of king James, which accelerated the revolution. But adverting to the immediate ſubject of this article we ſhall only obſerve, that by ſtatute 1 W. & M. c. 2. it is declared, that the ſuſpending or diſpenſing with laws by regal authority, without the conſent of parliament, is illegal: it is alſo a maxim in law, that it requires the ſame ſtrength to diſſolve as to create an obligation. See Blackſt. Com. vol. i. and vol iv. Neal's Hiſt. of the Puritans, vol. i. See PREROGATIVE.

DISPENSATION *by non obſtante.* See NON-OBSTANTE.

DISPENSATION, in *Pharmacy*, the diſpoſition and arrangement of ſeveral medicines, either ſimple or compound, all weighed in their proper doſes, or quantities, in order to be employed in the making of a compoſition.

DISPENSATIONS, *Divine*, in *Theology*, otherwiſe called the *works* and *ways of God*, denote thoſe ſchemes or methods which are deviſed and purſued by the wiſdom and goodneſs of God, in order to manifeſt his perfections and will to mankind, for the purpoſes of their inſtruction, diſcipline, reformation, and advancement in rectitude of temper and conduct, in order to promote their happineſs. Theſe are the grand ends of the divine diſpenſations; and in their aptitude to promote theſe ends conſiſts their peculiar excellence. The works or conſtitutions of nature are, in a general ſenſe, divine diſpenſations, by which God condeſcends to diſplay to us his being and attributes, and thus to lead us to the acknowledgment, adoration, love, and dutiful obedience of our creator, father, and benefactor. But beſides the general conſtitution

conſtitution of nature, there is a variety of other diſpenſations, which more immediately pertain to mankind, and in which they are more eſpecially intereſted. Such are their being born of parents for ſupplying the ſeveral generations of the world, whence reſult ſundry relations and duties; their being ſuſtained by food, covered and ſheltered by clothes and habitations, healed by phyſicians, and taught by the learned and ſkilful; their forming of ſocieties for mutual convenience and comfort; and the inſtitution of government, or the ſubordination of ſome to the authority of others, for preſerving good order, for the protection of virtue, and the reſtraint and puniſhment of vice. Moreover, wars, peſtilence, famine, earthquakes, perſonal and natural calamities, and ſimilar events, may be reckoned among the divine appointments or diſpenſations; ſome of which are deſigned for the exerciſe of our rational and moral powers in a courſe of right conduct; ſome for diſcipline, correction, and reformation; but none merely for deſtruction, except where reformation cannot be effected. But the ſacred ſcriptures reveal and record other diſpenſations of divine providence, which have been directed to the promotion of the religious principles, moral conduct, and true happineſs of mankind. Theſe have varied in ſeveral ages of the world, and have been adapted by the wiſdom and goodneſs of God to the circumſtances of his intelligent and accountable creatures. In this ſenſe the various revelations which God has communicated to mankind at different periods, and the means he has uſed, as occaſion has required, for their diſcipline and improvement, have been juſtly denominated divine diſpenſations. Accordingly, we read in the works of theological writers of the various diſpenſations of religion, as they exiſted before and after the fall of man, that of the patriarchs, that of Moſes, that of Chriſt, called the diſpenſation of grace, the perfection and ultimate object of every other; all of which were adapted to the conditions of the human race at theſe ſeveral periods; all of theſe in regular ſucceſſion mutually connected and preparatory one to the other; and all ſubſervient to the deſign of meliorating the world, and of contributing to the perfection and happineſs of its rational and moral inhabitants. See COVENANT and REVELATION.

DISPENSATORY, in *Medicine*, is ſynonymous to the word *Pharmacopœia*, and ſignifies a collection of formularies or directions for the uſe of apothecaries. Many private practitioners have written and publiſhed diſpenſatories; but thoſe which are of greateſt authority, have been compoſed by colleges or authorized bodies of medical men. Thus, in the United Kingdom, we have the London, the Edinburgh, and the Dublin pharmacopœia or diſpenſatory; the former being of moſt authority in England and Wales, the next in Scotland, and the laſt in Ireland. Neverthelefs, it is lawful for apothecaries to uſe either or all of them, as they may judge fit; only, it is required, when they deviate from the eſtabliſhed pharmacopœia, that they do ſo "by the ſpecial direction or preſcription of ſome learned phyſician." (See PHARMACOPOEIA.) The completeſt work of this kind now extant in this kingdom, is that of Dr. Duncan, Jun., entitled, "The Edinburgh New Diſpenſatory," which includes the lateſt editions of the three authorized pharmacopœias in one volume.

Although the apothecaries of London are enjoined, under his Majeſty's diſpleaſure, to keep all the ſimple and compound remedies preſcribed in the pharmacopœia of the royal college of phyſicians, and not to vary from them of their own accord, it is a fact that all the apothecaries do neverthelefs preſcribe daily for their patients, without regarding the formulæ of the college! But a much more lamentable fact is this, that any perſon who chuſes, however ignorant and unſkilful he is in phyſic, may ſet up as a druggiſt or an apothecary, and then may practiſe as a phyſician, *i. e.* he may attend the ſick and adminiſter whatever medicines he will; which, indeed, is done continually by hundreds of illiterate men in the metropolis and elſewhere, without being puniſhable by law! The vaſt quantities of licenſed quack medicines ſold annually, are compounded by ignorant men or women (with very few exceptions), to the great profit of the revenue and the certain detriment of his majeſty's ſubjects; proving how little avail are the ſtatutes of the college for preventing pharmaceutical abuſes, &c.! The firſt diſpenſatory, ſays Beckmann, (Hiſt. Invent. vol. ii.) was drawn up by Valerius Cordus, or at leaſt his was the firſt made known by the approbation of public magiſtrates. Haller has remarked one older; but it is now known only from the title mentioned by Maittaire. (Biblioth. Bot. i. p. 244.) Cordus, however, appears to have firſt uſed the word *diſpenſatorium* for a collection of receipts, containing directions how to prepare the medicines moſt in uſe. Some have ſaid that the book of Cordus was improved and enlarged by Matthiolus. But Beckmann ſays, that this is a miſtake, and that the error ſeems to have ariſen from the Chriſtian name of Matthias Lobelius, which ſtands in the title of ſome editions, becauſe his annotations are added to them.

DISPERIS, in *Botany*, (from δὶς, *double*, and πήρα, *a pouch*, becauſe the two lateral leaves of the calyx are each furniſhed with a little ſpur-like bag or cavity, which makes a part of the generic character,) Swartz. Orchid. 38. t. 1. f. F. Willd. Sp. Pl. v. 4. 59. Claſs and order, *Gynandria Monandria*. Nat. Ord. *Orchideæ*.

Gen. Ch. *Cal.* Perianth of three leaves; the upper one erect and vaulted, forming a ſort of helmet with the two petals; the two lateral ones ſpreading horizontally, each furniſhed with a central pouch or ſpur pointing downwards. *Cor.* Petals two, ſhorter than the calyx, dilated upwards, abrupt, ſheltered by the upper calyx-leaf. Nectary or lip proceeding from the baſe of the ſtyle, erect, tapering at the lower part, attached to the organs of impregnation, reflexed at the top under the helmet. *Stam.* and *Piſt.* Germen inferior, oblong, ſomewhat obovate; ſtyle very ſhort; ſtigma in front near the anther. Anther attached to the top of the ſtyle, erect or reclining, oblong, of two cells, covered with a veil which bears at its margin on each ſide in front, a little cartilaginous ſpiral appendage; pollen oblong, glutinous, its ſtalks glued to the tips of the appendages of the veil. *Peric.* Capſule of one cell, with three angles and three valves, burſting at the angles. *Seeds* numerous, minute, roundiſh, each with a membranous integument.

Eſſ. Ch. Calyx ſpreading; its two lateral leaves horizontal, ſomewhat ſpurred. Lip from the baſe of the ſtyle, erect, connected with the organs of impregnation. Anther covered with a veil bearing two ſpiral appendages in front.

Five ſpecies of this genus are enumerated by Swartz copied by Willdenow. 1. D. *capenſis* (Arethuſa capenſis; Linn. Supp. 405. Thunb. Prod. 3.), a native of the Table mountain at the Cape of Good Hope. "Stalk bearing two lanceolate leaves, and one flower." This is a pretty plant, about a foot high, with a purple flower remarkable for its long-pointed ſpreading calyx. 2. D. *villoſa*. (Arethuſa villoſa; Linn. Suppl. 405. Thunb. Prod. 3.) "Stem with two leaves and one flower. Bractea and germen hairy. Leaves ovate inclining to heart-ſhaped, ſmooth beneath, fringed at the margin." This grows alſo at the Cape, and is ſaid by the younger Linnæus to look like a *Commelina*. 3. D. *cucullata*. Swartz. Orchid. 40. Willd. Sp.

Sp. Pl. v. 4. 59. "Stem with two leaves and one flower. Germen smooth. Leaves oblong, downy beneath, as well as the bractea." Native of the Cape. 4. D. *secunda*. (Arethusa secunda; Thunb. Prod. 3. Ophrys circumflexa; Linn. Sp. Pl. 1344.) "Stem with two linear leaves, and many flowers leaning one way." This grows also at the Cape, and bears several yellowish green flowers, whose white veils and their twisted appendages are very conspicuous. 5. D. *cordata*. Swartz. Orchid. 41. Willd. 60. "Stem with two heart-shaped smooth leaves, and many separate flowers." Native of the island of Mauritius. *Flowers* yellowish, four or five in a sort of corymbus, with an ovate bractea to each. To these we are enabled to add a non-descript species. 6. D. *oppositifolia*. "Stem with two opposite ovate smooth leaves, and several bracteated flowers." Native of the isle de Bourbon, communicated by Dr. Smith from the Linnæan herbarium. *Root* tuberous. *Stem* a span high. *Leaves* above an inch long, opposite, about the middle of the stem, spreading, obscurely five-ribbed. *Flowers* three or four in a bracteated spike, yellowish. *Bracteas* elliptical.

DISPERSE, in *Military Language*. To disperse a body of men, in the heat of an engagement, and to rally them, so as to take advantage of an enemy scattering in pursuit, or leaving a strong post for that purpose, is a stratagem which has been resorted to at times with peculiar success. Being, however, extremely hazardous, it should only be practised with well disciplined troops, and by previous notice; when the signal to rally should likewise be communicated to every individual. In order to deceive the enemy more effectually, it is common to attack him in his entrenchments with great shew of vigor, and in the height of the conflict to beat the *retreat*; on this the assailants should retire in seeming disorder, but with studied attention to the object in view. If it be practicable to lead the enemy beyond some old building, or coppice, or hedge-row, behind which some men could be placed in ambush, the effect will be considerably encreased; both by encreasing the surprize, and panic, and by placing the enemy between two fires. It ought, however, to be always carried in mind, that when once soldiers turn their backs, they lose something of their confidence; and that it is extremely difficult to get them to face about at the proper moment. This device is best calculated for rangers, rifle-men, and other light corps.

DISPERSION *of Light*, in *Optics*, denotes the enlargement of a pencil or beam of light, which is produced by its passage from one medium into another, and this enlargement arises from the nature of the medium; but there is an enlargement of light, which arises from the form of the medium, and which is not comprehended under the denomination of the present article. We shall briefly endeavour to point out the distinction.

When a beam of light, (such, for instance, as proceeds from the sun, and comes into a room through a hole in a window shutter) is received upon a concave lens, and a sheet of paper is placed to receive it on the other side of, and at a little distance from, the lens; the luminous spot, which is thereby formed upon the paper, will be found much larger in diameter than the diameter of the hole in the shutter through which the light enters; the reason of which is, that on account of the concavity of the surface of the lens, every part of the beam of light, excepting the very axis of it, falls obliquely upon the surface of the lens, and is bent from the axis of it, in consequence of which it, the beam of light, proceeds in a diverging direction from the lens to the paper, and necessarily forms an enlarged spot upon the latter. Now this enlargement, being the effect of the peculiar figure of the lens, is not considered under the present article.

When a beam of light passes not in a perpendicular, but in an oblique direction from one medium into another medium of a different nature, such as from air into water, or into glass, &c. its straight direction is destroyed, *viz.* it is bent to a certain degree, and this bending is called the *refraction of light*; but besides its being bent, the beam of light is spread in a sectoral form, and is divided into coloured stripes (see the articles LIGHT and REFRACTION.) Now this spreading, which seems to arise from the nature of the medium, is called the *dispersion*, or *dissipation, of light*, and is the object of our present consideration. The following illustration will render the nature of it more evident.

Let H (*Plate* IV. *Optics*, *fig.* 7.) represent a small beam of the sun's light, which passes through the tube I, and falls obliquely at C, upon the surface A D, of the refracting medium A B D G, be it water, or glass, or other transparent substance. Let a circle of any diameter be drawn round the centre C, cutting the beam of light at O. Draw the perpendicular H N through C. The beam of light, by its falling obliquely upon the surface of the water at C, will be refracted, *viz.* will be bent, from its straight direction C P, into the more inclined direction C *s*, and will at the same time be spread into the sectoral shape *r* C *t*, which is called the *dispersion of the light*. This sector *r* C *t* is itself divided into smaller sectors of different colours; *viz.* next to the upper line C *r*, the colour is red, and thence the light gradually degenerates into orange, yellow, green, blue, indigo, and violet, which is nearest to the lower boundary C *t*. All this may be perceived by placing a white surface at the bottom of, or within, the refractive medium A B D G.

From the points O, *r*, *s*, and *t*, let perpendiculars be dropped on the line H N; then C *s*, which is drawn through the middle of the angle *r* C *t*, is the mean direction of the refracted light, and *s e* is its sine, or the *sine of the mean angle of refraction*; O M being the sine of the angle of incidence, *r w* and *t q* are the sines of the extremes, of which *t q* is the *sine of the most refrangible* colour, and *r w* the *sine of the least refrangible* colour.

It has been found, that through the same medium, the angle of dispersion is always proportionate to the mean angle of refraction, and, of course, when the mean angle of refraction is very small, then the angle of dispersion *r* C *t*, must be much smaller, in which case the different colours cannot be distinguished; but when the angle of incidence O C M, and consequently the mean angle of refraction *s* C N, are considerably larger; then the angle *r* C *t* of dispersion will also be large enough to exhibit the above-mentioned colours.

Different refractive media have different dispersive powers; for instance, the angle of incidence O C H, remaining the same, not only the mean angle of refraction *s* C N will vary according as the refractive medium A B D G is water, or glass, or oil, or diamond, &c. but the angle of dispersion *r* C *t* will also vary. And in some refracting media, the mean angle of refraction is larger, whilst the angle of dispersion is smaller; in other refracting media the mean angle of refraction is smaller, whilst the angle of dispersion is larger. In short, the knowledge of the mean refractive power of a given substance will not enable us to determine its dispersive power, and *vice versâ*.

Sir I. Newton, who made the important discovery of the different refrangibility of the rays of light, which converted the white solar light into the colours of the rainbow, when that light was made to pass obliquely from one transparent medium into another, had not the least suspicion of the

different difperfion arifing from the different natures of the media; and he imagined that the refrangibility of the extreme rays might be determined, if that of the mean was given. Or, in other words, that if the angles of refraction in different media were alike, the angles of difperfion in thofe media would likewife be alike; but it was referved for Mr. Dollond to fhew the fallacy of this fuppofition, which was confidered as true by all the philofophers of his time. Mr. Dollond began to fufpect the truth of it, and in the year 1757 he commenced a courfe of laborious experiments which confirmed him in his fufpicion, gradually fhewed him that different tranfparent fubftances were endowed with different difperfive powers, fhewed him the precife limits of thofe powers, and finally led him to make the capital difcovery of the achromatic telefcope, which depends upon the different difperfive powers of different forts of glafs, and which will doubtlefs tranfmit his name to the lateft pofterity. Mr. Dollond having thus fhewn the important ufes to which the different difperfive powers of tranfparent fubftances were applicable, feveral ingenious perfons readily took the fubject in hand, and endeavoured to afcertain the difperfive properties of various bodies, to fimplify the method of determining that property, and to apply it to optical ufes. The fimpleft, and, at the fame time, the accurate method of afcertaining the precife difperfive power of a given fubftance, is to form a prifm of it, to expofe it to a beam of folar light which enters a dark room through a hole, and then to meafure, as exactly as poffible, the angle of refraction, and the breadth of the fpectrum upon a fcreen placed at a given diftance from the prifm; and from thefe particulars the angle of difperfion in proportion to the angle of refraction may be eafily deduced; thus, by making prifms of different fubftances, but exactly of the fame refractive angle, and placing them fucceffively in the like circumftances, the peculiar difperfive powers of thofe fubftances may be afcertained. Mr. Euler, who gives particular inftructions refpecting the performance of this operation, advifes to make ufe of prifms with very large refracting angles, not lefs than 70 degrees. The Philofophical Tranfactions for the year 1802, art. xii. contains the account of a new method of examining the refractive and difperfive powers by means of prifmatic reflection, by Dr. W. H. Wollafton; but as the principal ufe of this method is for afcertaining the refractive powers of fubftances, the reader will find it defcribed under the article REFRACTION. With refpect to the difperfive powers, Dr. Wollafton did not meafure them with accuracy, nor indeed does his method, without fome farther improvement, feem capable of determining thefe powers with great precifion. We fhall in the fequel add his lift of difperfive powers, fuch as it is; but we fhall premife a lift of thofe fubftances, whofe difperfive powers have been afcertained with greater precifion.

TABLE of the difperfive Powers of various tranfparent Subftances, in comparifon of the difperfive Power of Water, which is reckoned 100.

			Difperfion.
White flint-glafs, of the fpecific gravity 3.29,			180
Glafs made of minium; *viz.* red-lead, and flint, in the proportion of	M. 3,	F. 1,	709
	2,	1,	524
	1,	1,	482
	$\frac{3}{4}$,	1,	325
	$\frac{1}{2}$,	1,	265
	$\frac{1}{4}$,	1,	200
Common plate-glafs, or coach-glafs, fp. gr. 2.76,			165
Crown-glafs, fp. gr. 2.52,			148
Brazil pebble, fp. gr. 2.62,			159
Glafs tinged red by means of gold, for enamel,			290
Glafs of *Saint Gobin*, in France,			149
Diamond,			286
Rock-cryftal,			121
Another fpecimen of the fame,			124
Ifland-cryftal,			169
Another fpecimen of the fame,			233
Water,			100
Water faturated with common falt,			122
Solution of fal ammoniac, or of muriated ammonia,			134
Nitric acid,			154

Dr. Wollafton's Table of difperfive Powers, refpecting which he fays,

"I have endeavoured to reduce the feveral fubftances, thus examined, to one table; but as the limits of colour are in few inftances fufficiently well defined for accurate menfuration, I have not attempted to add any numerical eftimate of their powers, but have merely afcertained the order in which they fucceed each other."

In this order the fubftances now follow:

Sulphur,	Amber,
Glafs of lead, ($\frac{1}{7}$ fand,)	Diamond,
Balfam of Tolu,	Alum,
Oil of faffafras,	Plate-glafs, Dutch,
Muriate of antimony,	Plate-glafs, Englifh,
Guaiacum,	Crown-glafs,
Oil of cloves,	Ruby, (fpinelle,)
Flint-glafs,	Water,
Colophony,	Sulphuric acid,
Canada balfam,	Alcohol,
Oil of amber,	Sulphate of barytes,
Jargon,	Selenite,
Oil of turpentine,	Rock-cryftal,
Copal,	Sulphate of potafh,
Balfam of Capivi,	White fapphire,
Anime,	Fluor fpar.
Iceland fpar,	

Mr. Zeiher of Peterfburgh, who compofed the fix kinds of glafs made with flint and minium, and examined their difperfive powers, which are ftated at the commencement of the firft table, willing to give a fuperior or more ufeful confiftence to thofe glaffes, tried to mix alkaline falts with them; but he was much furprifed to find that this mixture greatly diminifhed the mean refraction, almoft without making any change in the difperfion. After many trials, he, at length, obtained a kind of glafs, greatly fuperior to the flint-glafs ufed by Dollond, with refpect to the conftruction of telefcopes, fince it occafioned three times as great a difperfion of the rays as common glafs, at the fame time that the mean refraction was only as 1.61 to 1. (Ac. Berl. 1766.) Having now ftated all the moft effential obfervations which have been made by various ingenious philofophers refpecting the powers of difperfing the rays of light by a variety of fubftances, the reader may probably expect fome information relative to the caufe of that power, or rather to the caufe which renders that power greater in one body than in another. Were the difperfive power proportional to the refractive power, the phenomenon would occafion no wonder; but fince there feems to be no correfpondence whatever between the one and the other, the human mind is naturally led to make the above-mentioned enquiry. It is not, however, in our power to give our readers any fatisfactory information about it. The inveftigations of various philofophers have not furnifhed any thing more than conjectures.

conjectures. Some have attributed the difperfion of rays of different colours to a fort of elective attraction in the tranfparent body. "But," as Dr. Thomas Young juftly obferves, "an elective attraction of this kind is a property foreign to mechanical philofophy, and when we ufe the term in chemiftry, we only confefs our incapacity to affign a mechanical caufe for the effect, and refer to an analogy with other facts, of which the intimate nature is perfectly unknown to us."

The volume of the Philofophical Tranfactions for the year 1802, contains a paper of the above-mentioned gentleman, Dr. Thomas Young, on a peculiar production of colours. In that paper, Dr. Young offers an hypothefis, which is the neareft that has been offered, refpecting the difperfive powers of bodies, and with which we fhall conclude this article. "The colours," he fays, "of mixed plates fuggeft to me an idea, which appears to lead to an explanation of the difperfion of colours by refraction, perhaps more fimple and fatisfactory than that which I advanced in the laft Bakerian lecture. We may fuppofe that every refractive medium tranfmits the undulations conftituting light in two feparate portions, one paffing through its ultimate particles, and the other through its pores; and that thefe portions reunite continually, after each fucceffive feparation, the one having preceded the other by a very minute but conftant interval, depending on the regular arrangement of the particles of a homogeneous medium. Now, if thefe two portions were always equal, each point of the undulations, refulting from their reunion, would always be found half-way between the places of the correfponding point in the feparate portions; but fuppofing the preceding portion to be the fmaller, the newly combined undulation will be lefs advanced than if both had been equal, and the difference of its place will depend, not only on the difference of the lengths of the two routes, which will be conftant for all the undulations, but alfo on the law and magnitude of thofe undulations; fo that the larger undulations will be fomewhat further advanced after each reunion than the fmaller ones, and the operation recurring at every particle of the medium, the whole progrefs of the larger undulations will be more rapid than that of the fmaller; hence the deviation, in confequence of the retardation of the motion of light in a denfer medium, will of courfe be greater for the fmaller than for the larger undulations. Affuming the law of the harmonic curve for the motions of the particles, we might, without much difficulty, reduce this conjecture to a comparifon with experiment; but it would be neceffary, in order to warrant our conclufions, to be provided with accurate meafures of the refractive and difperfive powers of various fubftances, for rays of all defcriptions."

Dispersion *of Mankind*, in the *Hiftory of the World*, was occafioned by the confufion of tongues, and took place in confequence of the overthrow of Babel at the birth of Peleg; whence he derived his name: and it appears by the account given of his anceftors, Gen. chap. xi. 10—16. to have happened in the 101ft year after the flood, B.C. 2247, according to the Hebrew chronology, and by the Samaritan computation in the 401ft. However, various difficulties have been fuggefted by chronologers concerning the true era of this event. Sir John Marfham and others, in order to reconcile the Hebrew and Egyptian chronologies, maintain a difperfion of mankind before the birth of Peleg: others, unable to find numbers fufficient for the plantation of colonies in the fpace of 101 years, according to the Hebrew computation, fix the difperfion towards the end of Peleg's life, thus following the computation of the Jews, adopted by St. Jerom, and feveral of the Chriftian chronologers: Petavius affigns the 153d year after the flood; Cumberland, the 180th; and Ufher, though he generally refers it to the time of Peleg's birth, in one place affigns the 131ft after the flood for this event. Mr. Shuckford fuppofes the difperfion to have been gradual, and to have commenced with the feparation of fome companies at the birth of Peleg, and to have been completed thirty-one years after. According to the calculation of Petavius, the number of inhabitants on the earth at the birth of Peleg amounted to 32,768; Cumberland makes them 30,000; Mr. Mede ftates them at 7000 men, befides women and children; and Mr. Whifton, who fuppofes that mankind now double themfelves in four hundred years, and that they doubled themfelves between the deluge and the time of David in fixty years at a medium, when their lives were fix or feven times as long as they have been fince, by his computation, produces about 2389, a number much too inconfiderable for the purpofes of feparating and forming diftinct nations. This difficulty induced Mr. Whifton to reject the Hebrew, and to adopt the Samaritan chronology, as many others have done; which, by allowing an interval of 401 years between the flood and the birth of Peleg, furnifhes, by the laft mentioned mode of computation, more than 240,000 perfons. Ufher is of opinion, (Chron. Sacr. p. i. c. 5.) that in the 102d year after the flood, mankind might have increafed to the number of 388,605 males, and as many females. This uncommon increafe he afcribes to an extraordinary fecundity implied in that repeated command or bleffing, "Increafe and multiply, and fill the earth." But a much fmaller number than this would have been fufficient. Marfh. Can. Chron. fec. 1. Petav. Doctrin. Temp. lib. ix. c. 14. Cumb. Orig. Gent. Antiq. p. 142—154. Ufher ad A. M. 1757 & 1787. Whifton's View Chron. O. T.

As to the manner of the difperfion of the pofterity of Noah from the plain of Shinar, it was undoubtedly conducted with the utmoft regularity and order. The facred hiftorian informs us, that they were divided in their lands, every one according to his tongue, according to his family, and according to his nation; Gen. x. 5, 20, 31; and thus, as Mr. Mede obferves, they were ranged according to their nations, and every nation was ranged by their families, fo that each nation had a feparate lot, and each family in every nation. The following abftract will ferve to give a general idea of their refpective fettlements: Japhet, Noah's eldeft fon, had feven fons, *viz.* Gomer, whofe defcendants inhabited thofe parts of Afia, which lie upon the Ægean fea and Hellefpont northward, containing Phrygia, Pontus, Bithynia, and a great part of Galatia: the Galatians, according to Jofephus, were called Gomeræi; and the Cimmerii, according to Herodotus, occupied this tract of country: and from thefe Gomerians, Cimmerii or Celts, Mr. Camden derives our ancient Britons, who ftill retain the name Cymro or Cymru: Magog, the fecond fon of Japhet, was probably the father of the Scythians on the eaft and north-eaft of the Euxine fea: Madai planted Media, though Mr. Mede affigns Macedonia to his fhare: Javan was the father of the Grecians about Ionia, whofe country lies along upon the Mediterranean fea; the radicals of Javan and Ionia, being the fame יון: to Tubal and Mefhech belonged Cappadocia, and the country which lies on the borders of the Euxine fea; and from them, migrating over the Caucafus, it is fuppofed the Ruffians and Mufcovites are defcended: and Tiras occupied Thrace. The fons of Shem were five: Elam, whofe country lay between the Medes and Mefopotamians, and was

was called by the Gentile writers Elymais; and Joſephus calls the Elamites the founders of the Perſians: Aſhur, who, was driven out of Shinar by Nimrod, afterwards ſettled in Aſſyria, and there built Nineveh, and other cities: Arphaxad, who gave name to the country which Ptolemy calls Arraphacitis, a province of Aſſyria, though Joſephus makes him the father of the Chaldees: Lud, who inhabited, and, as ſome ſay, gave name to the country of Lydia, about the river Mæander, remarkable for its windings, in Aſia Minor: and Aram, the father of the Aſſyrians, who inhabited Meſopotamia and Syria, comprehending the countries weſtward of Aſſyria, as far as the Mediterranean ſea; within or bordering on this country of Aram, his four ſons probably ſettled. Ham, the youngeſt ſon of Noah, had four ſons, *viz.* Cuſh, whoſe poſterity ſpread into the ſeveral parts of Arabia, over the borders of the land of Edom, into Arabia Felix, up to Midian and Egypt: Mizraim, the father of them who inhabited Egypt, and other parts of Africa: Phut, to whom Bochart aſſigns the remaining part of Africa, from the lake Tritonides to the Atlantic ocean, called Libya: and Canaan, to whom belonged the land of Canaan, whence the Phœnicians derived their origin.

Upon this diſtribution of Noah's poſterity, we ſhall only obſerve, that the Deity preſided over all their counſels and deliberations, and that he guided and ſettled all mankind, according to the dictates of his all-comprehending wiſdom and benevolence. To this purpoſe, the ancients themſelves, according to Pindar, (Olymp. od. vii.) retained ſome idea, that the diſperſion of men was not the effect of chance, but that they had been ſettled in different countries by the appointment of Providence. (See Gen. xi. 8, 9. Deut. xxii. 8.)

This diſperſion, and that confuſion of languages with which it originated, was intended, by the counſel of an all-wiſe Providence, to counteract and defeat the ſcheme which had been projected by the deſcendants of Noah, for maintaining their union, and, of courſe, their ſuperiority and pre-eminence; implied in their propoſing to make themſelves a *name*, שם, which Schultens (in Job. i. 1.) derives from the Arabic verb שמה, or שמא, to be high, elevated, or eminent. Thus, they might think, by building a lofty tower, to keep off all that ſhould attempt to break in upon them, and to intimate to all future generations, that they were the true original governors, to whom all mankind ought to be in ſubjection. By this ſcheme, which ſeems to have been a project of ſtate policy, for keeping all men together under the preſent chiefs and their ſucceſſors, a great part of the earth muſt, for a long time, have been uninhabited, and over-run with wild beaſts. The bad effects which this project would have had upon the minds, the morals, and religion of mankind, was, probably, the chief reaſon why God interpoſed to fruſtrate it as ſoon as it was formed. It had manifeſtly a direct tendency to tyranny, oppreſſion, and ſlavery. Whereas in forming ſeveral independent governments by a ſmall body of men, the ends of government, and the ſecurity of liberty and property, would be much better attended to, and more firmly eſtabliſhed; which, in fact, was really the caſe; if we may judge of the reſt by the conſtitution of one of the moſt eminent, the kingdom of Egypt. (Gen. xlvii. 15—27.) The Egyptians were maſters of their perſons and property, till they ſold them to Pharoah for bread; and then their ſervitude amounted to no more than the fifth part of the produce of the country, as an annual tax payable to the king.

By this event, conſidered as a wiſe diſpenſation of Providence, bounds were ſet to the contagion of wickedneſs; evil example was confined, and could not extend its influence beyond the limits of one country; nor could wicked projects be carried on, with univerſal concurrence, by many ſmall colonies, ſeparated by the natural boundaries of mountains, rivers, deſerts, ſeas, and hindered from aſſociating together by a variety of languages, unintelligible to each other. Moreover, in this diſperſed ſtate, they could, whenever God pleaſed, be made reciprocal checks upon each other, by invaſions and wars; which would weaken the power, and humble the pride of corrupt and vicious communities. This diſpenſation was, therefore, properly calculated to prevent a ſecond univerſal degeneracy; God dealing in it with men as rational agents, and adapting his ſcheme to their ſtate and circumſtances. Mede's Works, vol. i. diſc. 50. p. 276, &c. Bochart, Phaleg. lib. iii. & iv. Patrick in loc. Shuckford's Conn. vol. i. book i. and Un. Hiſt. vol. i. part 3. book i. chap. 2. § 6.

Dr. Bryant has advanced a new hypotheſis on this ſubject, and ſupported it with his uſual acuteneſs and learning: he maintains, that the diſperſion, as well as the confuſion of tongues, was local, and limited to the inhabitants of the province of Babel; that the ſeparation and diſtribution, recorded to have taken place in the days of Peleg, Gen. x. 25, 31, 32. which was the reſult of divine appointment, occaſioned a general migration; and that all the families among the ſons of men were concerned in it: the houſe of Shem, from which the Meſſiah was to ſpring, was particularly regarded in this diſtribution; the portion of his children was near the place of ſeparation; they in general had Aſia to their lot; as Japhet had Europe, and Ham the large continent of Africa. But the ſons of Chus would not ſubmit to the divine diſpenſation; they went off under the conduct of Nimrod, and ſeem to have been for a long time in a roving ſtate: however, at laſt they arrived at the plains of Shinar, and having ejected Aſhur and his ſons, who were placed there by divine appointment, ſeized his dominions, and laid there the foundation of a great monarchy. But afterwards fearing leſt they ſhould be divided and ſcattered abroad, they built the tower of Babel, as a land mark, to which they might repair, and probably to anſwer the purpoſes of an idolatrous temple, or high altar, dedicated to the hoſt of heaven, from which they were never long to be abſent. They only, *viz.* the ſons of Chus or the Cuthites, and their aſſociates from other families, who had been guilty of rebellion againſt divine authority, and of wicked ambition and tyranny, were puniſhed with the judgment of confounded ſpeech through a failure in labial utterance, and of the diſperſion recorded in Gen. x. 8, 9: in conſequence of which they were ſcattered abroad from this city and tower, without any certain place of deſtination. The Cuthites invaded Egypt or the land of Mizraim, in its infant ſtate, ſeized the whole country, and held it for ſome ages in ſubjection; and they extended likewiſe to the Indies and Ganges, and ſtill farther into China and Japan. From them the province of Cuſhan or Goſhen in Egypt derived its name; here they obtained the appellation of royal ſhepherds; and when they were by force driven out of the country, after having been in poſſeſſion of it for two hundred and ſixty, or two hundred and eighty years, the land which they had been obliged to quit was given to the Iſraelites, who were alſo denominated ſhepherds, but ſhould not be confounded with the former or the antecedent inhabitants of Goſhen. Bryant's Analyſis of Ancient Mythol. vol. iii. p. 16, &c. See Cush.

Dispersion *of inflammations*, in *Medicine.* See Inflammations.

DISPLANTING, among *Gardeners*, is the plucking up of a tree or plant out of the ground.

Displanting *fcoop*, an inftrument for taking up plants, with earth about their roots.

DISPLAYED, in *Heraldry*, is underftood of the pofition of an eagle, or other bird, when it is erect, with its wings expanded, or fpread forth.

DISPONDEE, in the *Greek* and *Latin Poetry*, a double fpondee; or a foot confifting of four long fyllables: as *jūrāmēntūm, dēlēctāntē*, ϑάυμαζοντων.

DISPONTIUM, in *Ancient Geography*, a deferted town of Triphylia, N. of Heraclon, whofe inhabitants, in the time of Strabo, had emigrated to Epidamnus and Apollinia, a town of Illyria.

DISPOSITION, from *dis*, and *pono*, I place, in *Architecture*, is the juft placing of all the feveral parts of an edifice, according to their proper nature and office. See Building.

Disposition, in *Logic*, is that operation of the mind, whereby we put the ideas, propofitions, and arguments which we have formed concerning one fubject, into fuch an order as is fitteft to gain the cleareft knowledge of it, to retain it longeft, and to explain it to others in the beft manner: the effect of this is called method. Watt's Logic.

Disposition, in a *Military Senfe*, is the arrangement of an army or body of men upon the moft advantageous ground, and in the beft fituation for a vigorous attack or defence.

Disposition, in *Phyfiology*, denotes a ftate of mind diftinguifhing one man from another and inherent in the conftitution of nature, which, while it lafts, gives a tendency, or pronenefs, to be moved by certain animal principles, rather than by others; while, at another time, another ftate of mind, in the fame perfon, may give the afcendant to other animal principles. As far as we can trace the caufes of the different difpofitions of the mind, they feem to be in fome cafes owing to thofe affociating powers of the principles of action, which have a natural affinity, and are prone to accompany one another; fometimes to accidents of good or bad fortune, and fometimes the ftate of the body may have an influence on the difpofition of the mind. At one time the ftate of the mind, like a ferene unclouded fky, fhews every thing in the moft agreeable light; then a man is prone to benevolence, compaffion, and every kind affection; unfufpicious, not eafily provoked. The poets have obferved, that men have their "mollia tempora fandi," when they are averfe from faying or doing a harfh thing, and artful men watch thefe occafions, and know how to improve them to promote their ends. This difpofition is commonly called "good humour," of which, in the fair fex, Mr. Pope fays,

"Good humour only teaches charms to laft,
Still makes new conquefts, and maintains the paft."

There is no difpofition more comfortable to the perfon himfelf, or more agreeable to others than good humour. It is to the mind what good health is to the body; gives a man the capacity of enjoying every thing that is agreeable in life, and of ufing every faculty without impediment. It difpofes to contentment, benevolence, and fympathy; and whilft it prefents every object in the moft favourable light, it inclines us to avoid giving or taking offence. This happy difpofition feems to be the natural fruit of a good confcience, and of a firm belief that the world is under a wife and benevolent adminiftration; and when it fprings from this root, it is an habitual fentiment of piety. The oppofite difpofition, called "bad humour," has a contrary influence; an influence as malignant as the other is falutary. It tinges every object with its own difmal colour, and like a part that is galled, it is hurt by every thing that touches it. It takes offence where none was intended, and difpofes to difcontent, jealoufy, envy, and, in general, to malevolence.

There are other oppofite difpofitions, which are "elation" of mind, on one hand, and "depreffion" on the other. Thefe may be good or bad, as they are grounded on true or falfe opinion, and as they are regulated. The former, when it arifes from a juft fenfe of the dignity of our nature, is true magnanimity, and difpofes a man to the nobleft virtues, and the moft heroic actions and enterprifes. When it arifes from a confcioufnefs of our worth and integrity, it may be called the pride of virtue, which is noble and excellent, and conftitutes the true fenfe of honour; but when it fprings from a vain opinion of our poffeffing talents or worth, which do not belong to us, or from an undue eftimate of the value of thofe we actually poffefs, it is pride, and produces arrogance, contempt of others, felf-partiality, and vicious felf-love. Depreffion, on the other hand, proceeding from a juft fenfe of the weaknefs and imperfections of human nature, and of our own perfonal defects and faults, is true humility, which is not inconfiftent with real magnanimity. But in other cafes, it is oppofite to magnanimity, and debilitates the fprings of action, and chills every fentiment that fhould lead to any noble exertion, or enterprife. This depreffion of mind may fometimes be owing to melancholy, and may produce ftrange opinions; and at other times our opinions may have a very confiderable influence, either to elevate, or deprefs the mind, even where no melancholy attends them. (Reid's Effays on the Active Powers of Man, Eff. iii. ch. 7.) The difpofition, or original bent of the mind, which tends to form, or upon which is grafted, the habitual temper and difcriminating character, is fometimes called *propenfity*, which, ufed more generally, includes *principle*, as well as *difpofition*.

Disposition, in *Rhetoric*, is defined, by Cicero, the act of diftributing the things, or arguments, invented, or found out, into a proper order; or, a due placing, or ranging the feveral parts of fpeech, or difcourfe.

Difpofition in oratory differs from that operation of the mind which is fo called by logicians. The logician fo places the feveral propofitions of a fyllogifm in a certain prefcribed method, that the relation between the terms may be evident, and the conclufion appear to be fairly drawn from the premifes. And if either of the premifes feems weak, or the truth of it not fufficiently clear, he fupports it by a frefh argument; and fo proceeds in one fuccinct and uniform chain of reafoning, till he has made out the proof of what he had at firft propofed. But the orator is not thus tied down to mode and figure; or to perfect fyllogifms, which he feldom ufes: but reafons in the manner that feems to him moft convenient: he begins with either of the premifes, and fometimes with the conclufion itfelf; confirms one part with proper reafons, and enlarges upon it for greater evidence and variety, before he proceeds to another; and drops any part, which he thinks fufficiently clear of itfelf, and may be fupplied by the attentive hearer. And thus, by a diverfity of method, and an agreeable variety, he confults the pleafure and entertainment of his hearers, as well as their inftruction. Befides, he confiders the frame and ftructure of his whole difcourfe, and as his view is not every where the fame, he divides it into certain parts, and fo difpofes each of them, as may beft anfwer his intention. From all which it appears, that difpofition, confidered as a part of oratory, is widely different from that which logic teaches.

Difpofition

Difpofition makes one of the great branches, or divifions, of rhetoric. Ifocrates was the firft among the Greeks, that made them fenfible of the beauty of difpofition; and Cicero among the Romans.

The difpofition is of the fame neceffity in oratory, as the marfhalling of an army in order to a battle; or a beautiful compofition in architecture, painting, &c. Horace enjoins it exprefsly in poetry: "Singula quæque locum teneant fortita decenter." Quintilian has well obferved, (Inft. Orat. lib. vii.); "A difcourfe that wants difpofition muft neceffarily be confufed, and without connection, liable to frequent tautologies and omiffions; and like one wandering in the dark, be conducted by chance rather than defign." Order and regularity are always pleafant and agreeable; we admire them in nature; and they are no lefs beautiful in art, and particularly in difcourfe. The difpofition, then, is the order, or arrangement, of the parts of an oration; which parts are ufually reckoned four, *viz.* the exordium, or introduction; the narration; the confirmation; and the peroration, or conclufion. Ariftotle, (De Rhetor. l. iii. c. 13.) mentions the four following; *viz.* introduction, propofition, proof, and conclufion. Quintilian, (Inft. Orat. l. iii. c. 9.) makes five parts, introduction, narration, confirmation, refutation, and conclufion. Though fome make them fix, *viz.* the exordium, divifion, narration, confirmation, confutation, and peroration; as indicated in that popular verfe:

"Exorfus, narro, feco, firmo, refuto, peroro."

But the divifion is more naturally referred to the exordium; and the confutation to the confirmation. Cicero alfo, (De Invent. l. i. c. 14.) enlarges them to fix, thus: introduction, narration, propofition, confirmation, confutation, and conclufion.

The difpofition is either natural, or artificial. Natural, is the order the parts are above rehearfed in. Artificial, is when, for fome particular reafon, we recede from the order of nature. See each part under its proper article, EXORDIUM, &c.

DISPOSSESSION, in *Law*. See DISSEISIN and OUSTER.

DISPROPORTION, a term of relation implying a want of proportion, or fymmetry.

DISPROVING, in *Rhetoric*. See REFUTATION.

DISPUTE, or DISPUTATION, from *dis*, and *puto*, I think, in the *Schools*, *&c.* a conteft, or combat, either by word, or writing, on fome point of learning, or religion, for a degree, prize, exercife, or even for the mere fake of truth, or advantage of a party, or the honour of a triumph. See THESIS.

The Port Royalifts take occafion to obferve, that nothing gives fo many different lights and openings, for difcovering the truth, as difputation. The movements of a mind, employed fingly in the examination of any fubject, are ufually too cool and languid; the mind needs a certain degree of heat to awake its ideas. Now, by the oppofitions in a difpute, we come to find wherein the difficulty lies, and the vigour the mind has acquired enables us to furmount it.

DISQUISITION, from *dis*, and *quæro*, I enquire, an enquiry into the nature, kinds, and circumftances of any problem, queftion, or topic; in order to gain a right notion of it, and to difcourfe clearly about it.

DISS, in *Geography*, a market town and parifh, in the hundred of Difs. in the county of Norfolk, England, is 14 miles fouth of Norwich, and 90 from London. It is built on the northern bank of the river Waveney, which divides the counties of Norfolk and Suffolk at this place, and contains 325 houfes, with 2246 inhabitants. The principal ftreets are paved, and many of the houfes are well built, prefenting an afpect of comfort and refpectability. Here are fome manufactories for hempen cloth and hofe; and many of the inhabitants are employed in making ftays. The markets, held on Fridays, are fupplied with great quantities of yarn, linen cloth, and provifions. The church is a large ancient building. John Skelton, king's orator and poet-laureat to Henry VIII., was rector of this town for many years. Blomefield's Hiftory of Norfolk.

DISSAY, a fmall town of France, in the department of the Vienne; nine miles S. E. of Château du Loir.

DISSDORF, a town of Germany, in the circle of Upper Saxony, and Old Mark of Brandenburg; 16 miles W. S. W. of Salzwedel.

DISSECTION, in *Anatomy*, from *dis* and *feco*, *I cut*, is the divifion of any part of the body by means of knives, fciffars, &c. This, in general, is performed on the dead fubject, for the purpofe of expofing the different organs in their natural fituation, and learning their connections and ftructure. In its moft extenfive fenfe, it may be confidered to include, not merely the fimple expofure and divifion of the parts in a recent body, but alfo every procefs in practical anatomy which can contribute to elucidate the ftructure of our frame; as all the methods of preparing the various organs, by means of injection, maceration, corrofion, &c.; of preferving thefe by drying, varnifhing, immerfion in fpirits, oil of turpentine, and other liquors, which conftitute the art of making anatomical *preparations*. This branch of diffection is exercifed with a view to difcover the natural ftructure and relations of parts; but we employ it alfo, in order to obferve the effects produced in the organization of the body by difeafe, and this conftitutes *morbid* anatomy. Every procefs then that can tend to illuftrate the ftructure of the body, whether in health or difeafe, and to expofe its component parts in their natural or morbidly changed relations of figure, pofition, and connection, may be regarded as a branch of the art of diffection. This is the way in which we propofe to confider the fubject in the prefent work; but as, in this mode of regarding it, diffection becomes moft intimately connected with the art of making anatomical preparations, we fhall refer the whole account to that article.

DISSECTION *of Murderers*. See MURDER.

DISSEISIN, in *Law*, an unlawful difpoffeffing a man of his land, tenement, or other immoveable and incorporeal right.

This is a fpecies of injury by oufter, or a privation of the freehold, confifting in a wrongful putting out of him that is feifed of the freehold. It differs from *abatement* and *intrufion*, which denote a wrongful entry where the poffeffion was vacant, by its being an attack upon him who is in actual poffeffion, and turning him out of it. The former were an oufter from a freehold in law, this is an oufter from a freehold in deed. Diffeifin may be effected either in corporeal inheritances, or incorporeal. Diffeifin of things corporeal, as of houfes, lands, &c. muft be by entry and actual difpoffeffion of the freehold (Co. Litt. 181.); as if a man enters either by force or fraud into the houfe of another, and turns, or at leaft keeps, him or his fervants out of poffeffion. Diffeifin of incorporeal hereditaments cannot be an actual difpoffeffion; for the fubject itfelf is neither capable of actual bodily poffeffion, nor difpoffeffion; but it depends on their refpective natures and various kinds; being, in general, nothing more than a difturbance of the owner in the means of coming at, or enjoying them. With regard to freehold rent in particular, our ancient law-books (Finch. L. 165, 166. Litt. § 237, &c.) mention five methods of working a diffeifin

diſſeiſin thereof: 1. By *encloſure;* where the tenant ſo encloſeth the houſe or land, that the lord cannot come to diſtrain thereon, or demand it: 2. By *foreſtaller*, or lying in wait; when the tenant beſetteth the way with force and arms, or by menaces of bodily hurt, affrights the leſſor from coming: 3. By *reſcous;* that is, either by violently retaking a diſtreſs taken, or by preventing the lord, with force and arms, from taking any at all: 4. By *replevin;* when the tenant replevies the diſtreſs at ſuch time when his rent is really due: 5. By *denial;* which is, when the rent being lawfully demanded is not paid. All, or any of theſe circumſtances, amount to a diſſeiſin of rent; that is, they wrongfully put the owner out of the only poſſeſſion, of which the ſubject matter is capable, namely, the receit of it. But all theſe diſſeiſins of hereditaments incorporeal, are only ſo at the election and choice of the party injured; if, for the ſake of more eaſily trying the right, he is pleaſed to ſuppoſe himſelf diſſeiſed (Litt. § 588, 589.) Otherwiſe, as there can be no actual diſpoſſeſſion, he cannot be compulſively diſſeiſed of any incorporeal hereditament. Thus alſo, even in corporeal hereditaments, a man may frequently ſuppoſe himſelf to be diſſeiſed, when he is not ſo in fact, for the ſake of entitling himſelf to the more eaſy and commodious remedy of an Assise *of novel diſſeiſin*, (which ſee,) inſtead of being driven to the more tedious proceſs of a writ of entry (4 Burr. 110.). The true injury of compulſive diſſeiſin, ſeems to be that of diſpoſſeſſing the tenant, and ſubſtituting oneſelf to be the tenant of the land in his ſtead; in order to which, in the times of pure feodal tenure, the conſent or connivance of the lord, who, upon every deſcent or alienation, perſonally gave, and who, therefore, alone could change the ſeiſin or inveſtiture, ſeems to have been conſidered as neceſſary. But when, in proceſs of time, the feodal form of alienations were off, and the lord was no longer the inſtrument of giving actual ſeiſin, it is probable that the lord's acceptance of rent or ſervice, from him who had diſpoſſeſſed another, might conſtitute a complete diſſeiſin. Afterwards, no regard was had to the lord's concurrence, but the diſpoſſeſſor himſelf was conſidered as the ſole diſſeiſor; and this wrong was then allowed to be remedied by entry only, without any form of law, or againſt the diſſeiſor himſelf; but required a legal proceſs againſt his heir or alienee. And when the remedy by aſſiſe was introduced, under Henry II., to redreſs ſuch diſſeiſins as had been committed within a few years next preceding, the facility of that remedy induced others, who were wrongfully kept out of the freehold, to feign, or allow themſelves to be diſſeiſed, merely for the ſake of the remedy. Blackſt. Comm. book iii. ch. 10.

By Magna Charta, 9 Henry III. c. 29, no man is to be diſſeiſed, or put out of his freehold, but by lawful judgment of his peers, or by the law of the land; and by ſtat. 32 Hen. VIII. c. 33. the dying ſeiſed of any diſſeiſor of, or in any lands, &c. having no right therein, ſhall not be a deſcent in law, to take away an entry of a perſon having lawful title of entry, except the diſſeiſor hath had peaceable poſſeſſion five years, without entry or claim by the perſon having lawful title. See Disseisor.

Diſſeiſin, according to ſome writers, is of three ſorts, *viz.* ſimple diſſeiſin, committed by day, without force and arms: and diſſeiſin by force, for which ſee Deforceor, and Fresh *diſſeiſin*. See alſo Re-disseisin and Post-disseisin.

Aſſiſes are called writs of diſſeiſin, which lie againſt diſſeiſors in any caſe: whereof ſome are termed little writs of diſſeiſin, as being vicontial, that is, ſuable before the ſheriff in the county-court, becauſe determinable by him without aſſize.

Disseisin, *aſſiſe of novel.* See Assise.

Disseisin, *warranty by.* See Warranty.

DISSEISOR, he who diſſeiſeth, or puts another out of his land: as *diſſeiſee* is he who is put out.

If a diſſeiſor, after he has expelled the right owner, gains peaceable poſſeſſion of the lands five years without claim, and continues in poſſeſſion, ſo as to die ſeiſed, and the land deſcends to his heirs, they will have a right to the poſſeſſion till the owner recovers at law; and the owner ſhall loſe his eſtate for ever, if he doth not proſecute his ſuit within the time limited by the ſtatute of limitations.

And if a diſſeiſor levy a fine of the land whereof he is diſſeiſed unto a ſtranger, the diſſeiſor ſhall keep the land for ever; for the diſſeiſor againſt his own fine cannot claim, and the conuſee cannot enter, and the right which the diſſeiſor had, being extinct by the fine, the diſſeiſor ſhall take advantage of it. (2 Rep. 56.) But this is to be underſtood, where no uſe is declared of the fine by the diſſeiſee; when it ſhall enure to the uſe of the diſſeiſor, &c. (1 Lev. 128.) See Claim, *continual.* A diſſeiſor in aſſize, where damages are recovered againſt him, ſhall recover as much as he hath paid in rents chargeable on the lands before the diſſeiſin. (Jenk. Cent. 189.) But if the diſſeiſor or his feoffee ſows corn on the land, the diſſeiſee may take it before or after ſeverance. (Dyer 31. 173. 11 Rep. 46.) Where a man hath a houſe in fee, &c. and locks it, and then departs; if another perſon comes to his houſe, and takes the key of the door, and ſays that he claims the houſe to himſelf in fee, without any entry into the houſe, this is a diſſeiſin of the houſe. (2 Danv. Abr. 624.) If the feoffor enters on the land of the feoffee, and makes a leaſe for years, &c. it is a diſſeiſin; though the intent of the parties to the feoffment was, that the feoffee ſhould make a leaſe to the feoffor for life. (2 Rep. 59.) If leſſee for years is ouſted by his leſſor, this is ſaid to be no diſſeiſin. (Cro. Jac. 678.) A man who enters on another's land, claiming a leaſe for years, who hath not ſuch leaſe, is a diſſeiſor; though if a man enters into the houſe of another by his ſufferance, without claiming any thing, it will not be a diſſeiſin. (9 Hen. VI. 21, 31. 2 Danv. 625.) If a perſon enters on lands by virtue of a grant or leaſe, that is, void in law, he is a diſſeiſor. (2 Danv. 630.)

As the king in judgment of law can do no wrong, he cannot be a diſſeiſor. (1 Ed. V. 8.) A diſſeiſor is to be fined and impriſoned; and the diſſeiſee reſtored to the land, &c. by ſtat. 20. Hen. III. c. 3. Where a diſſeiſor is diſſeiſed, it is called diſſeiſin upon diſſeiſin.

DISSEMINATE Vacuum. See Vacuum *diſſeminatum.*

DISSEN, in *Geography*, a ſmall town of Germany, in the circle of Weſtphalia, which formerly belonged to the biſhopric of Oſnabruck, but is at preſent included in the poſſeſſions of the new king of Weſtphalia.

DISSENHOFEN. See Diessenhofen.

DISSENTERS, a general denomination of equal import with non-conformiſts; and comprehending certain ſects, or parties, in England, who, in matters of religion, church diſcipline, and ceremonies, diſſent from, or diſagree with the church of England, and have a toleration by law for the ſame Such, particularly, are the preſbyterians, independents, anabaptiſts, and quakers. See Presbyterians, &c.

The diſſenters, with reſpect to their legal condition, have, in former periods, been ſubject to ſeveral diſabilities and reſtrictions, (which, ſays judge Blackſtone, I ſhall not undertake to juſtify,) laid upon them by abundance of ſtatutes (23 Eliz. c. 1. 29 Eliz. c. 6. 35 Eliz. c. 1. 22 Car. II. c. 1.); concerning which he obſerves, "that the legiſlature, with a ſpirit of true magnanimity, extended that indulgence to theſe ſectaries, which they themſelves, when in power, had held

held to be countenancing ſchiſm, and denied to the church of England;" (referring to the ordinance of 1645, which enforced the uſe of the DIRECTORY, and which inflicted impriſonment for a year on the third offence, and pecuniary penalties on the former two, in caſe of uſing the book of common prayer, not only in a place of public worſhip, but alſo in any private family.) The penalties are conditionally ſuſpended by the ſtatute 1 W. and M. ſt. 1. c. 18. "for exempting their majeſties' proteſtant ſubjects, diſſenting from the church of England, from the penalties of certain laws," commonly called the TOLERATION *act* (which ſee); which act is confirmed by ſtatute 10 Ann. c. 2. and declares, that neither the laws above-mentioned, nor the ſtatutes 1 Eliz. c. 2. § 14. 3 Jac. I. c. 4 and 5, nor any other penal laws made againſt popiſh recuſants (except the teſt acts) ſhall extend to any diſſenters, other than papiſts and ſuch as deny the Trinity: provided, 1. That they take the oaths of allegiance and ſupremacy (or make a ſimilar affirmation, being quakers, ſtat. 8 Geo. I. c. 6.) and ſubſcribe the declaration againſt popery; 2. That they repair to ſome congregation certified to and regiſtered in the court of the biſhop or archdeacon, or at the county ſeſſions; 3. That the doors of ſuch meeting-houſe ſhall be unlocked, unbarred, and unbolted, in default of which the perſons meeting there are ſtill liable to all the penalties of the former acts. Diſſenting teachers, in order to be exempted from the penalties of the ſtatutes 13 and 14 Car. II. c. 4. 15 Car. II. c. 6. 17 Car II. c. 2. and 22 Car. II. c. 1. are alſo to ſubſcribe the articles of religion mentioned in the ſtatute 13 Eliz. c. 12. (which only concerns the confeſſion of the true Chriſtian faith and the doctrine of the ſacraments,) with an expreſs exception of thoſe relating to the government and powers of the church, and to infant baptiſm: or if they ſcruple ſubſcribing the ſame, ſhall make and ſubſcribe the declaration preſcribed by ſtatute 19 Geo. III. c. 44. profeſſing themſelves to be Chriſtians and proteſtants, and that they believe the ſcriptures to contain the revealed will of God, and to be the rule of doctrine and practice. Thus, though the *crime* of non-conformity, as Blackſtone expreſſes it, is by no means univerſally abrogated, it is ſuſpended and ceaſes to exiſt with regard to thoſe proteſtant diſſenters, during their compliance with the conditions impoſed by theſe acts; and, under theſe conditions, all perſons who will approve themſelves no papiſts or oppugners of the Trinity, are left at full liberty to act as their conſciences ſhall direct them, in the matter of religious worſhip. And if any perſon ſhall wilfully, maliciouſly, or contemptuouſly diſturb any congregation, aſſembled in any church or permitted meeting-houſe, or ſhall miſuſe any preacher or teacher there, he ſhall (by virtue of the ſame ſtatute 1 W. and M.) be bound over to the ſeſſions of the peace, and forfeit 20*l.* But by ſtatute 5 Geo. I. c. 4. no mayor or principal magiſtrate muſt appear at any diſſenting meeting with the enſigns of his office, on pain of diſability to hold that or any other office: the legiſlature judging it a matter of propriety, that a mode of worſhip ſet up in *oppoſition* to the national (ſays the learned judge) when allowed to be exerciſed in peace, ſhould be exerciſed alſo with decency, gratitude, and humility.

Diſſenters alſo, who ſubſcribe the declaration of the act 19 Geo. III. are exempted (unleſs in the caſe of endowed ſchools and colleges) from the penalties of the ſtatutes 13 and 14 Car. II. c. 4. and 17 Car. II c. 2. which prohibit (upon pain of fine and impriſonment) all perſons from teaching ſchool unleſs they be licenſed by the ordinary, and ſubſcribe a declaration of conformity to the liturgy of the church; and reverently frequent divine ſervice *eſtabliſhed* by the laws of this kingdom.

Diſſenters choſen to any parochial or ward offices, and ſcrupling to take the oaths, may execute the office by deputy, who ſhall comply with the law in this behalf. (Stat. 1 W. & M. ſt. 1. c. 18.) See CONSTABLE. Diſſenters are not ſubject to fine on refuſing to ſerve corporation offices. For where a freeman of London was elected one of the ſheriffs, but refuſed to take the office on account of his being a diſſenter, and as ſuch not having received the ſacrament according to the rites of the church of England, within a year before his election, an action was brought againſt him in the ſheriff's court for the penalty incurred by ſuch refuſal, and a judgment recovered, which judgment was affirmed in a writ of error brought in the court of Huſtings. But the defendant having obtained a ſpecial commiſſion of errors, the judges delegates reverſed both judgments; and on a writ of error in parliament, this judgment of reverſal was affirmed; the judges (except one) being of opinion that the defendant was at liberty to object to the *validity* of his election on the ground of his own non-conformity. (3 Bro. P. C. 8vo. ed. 465. Harriſon v. Evans.) The general principle and ſpirit of this deciſion, reſtricted in this caſe to the ſheriffs of corporations, have been thought to extend to thoſe of counties; and in ſeveral caſes that have ſince occurred the obligation of ſerving this office, under the plea of diſſent, has not been enforced.

The diſſenters have complained that judge Blackſtone has not truly repreſented their preſent legal condition. According to his ſtatement mere non-conformity is a crime, though, as he elſewhere ſays, not ſo great as ſome others, and is ſo conſidered in the eye of the law, notwithſtanding the toleration-act. The *penalties*, indeed, by that act, are *ſuſpended*, but the *crime* ſtill ſubſiſts. Upon this ſtatement it has been obſerved by an able advocate of their cauſe (ſee letters to Blackſtone by P. Furneaux, D. D. 1770), that ſuſpenſion of penalty is not the language of the toleration-act. The act uſes a comprehenſive and forcible expreſſion, which excludes the *crime* as well as the *penalty*; it leaves theſe penal ſtatutes no operation at all, with reſpect to the diſſenters who are under the toleration-act; it repeals and annihilates thoſe ſtatutes with regard to ſuch diſſenters. The words of the act are, that thoſe ſtatutes ſhall not be conſtrued to *extend* to ſuch perſons; and if they are not to be conſtrued to *extend* to them, nothing can be plainer, than that they are not to be conſtrued to *affect them at all*, either as to crime or penalty. If, therefore, the ſtatute-law doth not make non-conformity a crime, it is certain that it is no crime at all by the common law; becauſe the conſtitution of the church, and its peculiar doctrine, worſhip, diſcipline, and government are founded wholly upon the ſtatute-law, and not at all upon the common law. It would have been more juſt, as well as more candid, if the learned judge had ſaid, that all penal laws for non-conformity are *repealed*, with regard to thoſe diſſenters who are qualified as the act directs. It has been farther alleged, that both the crime and penalty of mere proteſtant non-conformity to the eſtabliſhed rites and modes of worſhip appear to be aboliſhed, by the act of toleration, from the protecting clauſes of that act; which, in the words of a great lawyer, (the late lord Mansfield,) have rendered the diſſenters' way of worſhip "not only innocent but lawful; have put it, not merely under the connivance, but under the protection of the law; have *eſtabliſhed* it. For nothing can be plainer than that the law protects nothing in that very reſpect, in which it is, at the ſame time, in the eye of the law a crime. Diſſenters, by the act of toleration, therefore, are reſtored to a legal conſideration and capacity." Beſides, the unanimous judgment of the commiſſioners-delegates, and of the houſe of lords affirming that judgment (Feb. 7, 1767), in the great cauſe

between

between the city of London and the diffenters, concerning the fine inflicted by a bye-law of the city on thofe who refufed the office of fheriff, was grounded entirely on this opinion, *viz.* "that the toleration act removed the crime as well as the penalty of mere non-conformity." The arguments of the judges in this caufe turned upon the fingle point, "that the toleration act removed the *crime* as well as the *penalties* of non-conformity;" and in this they all, except one, agreed. The whole was fummed up and the reafoning on the oppofite fide examined and confuted, with great perfpicuity and force of argument, by lord Mansfield; and upon this ground the houfe of lords affirmed, *nemine contradicente*, the judgment of the commiffioners delegates. Mr. Onflow, formerly fpeaker of the houfe of commons, whofe excellent principles and character have been always held in high eftimation, declared his decided approbation of the term *eftablifhed*, as applied by the noble lord already mentioned to the worfhip of diffenters, and he moreover faid that this was the language which he himfelf always ufed; adding, that as far as the authority of the law could go in point of *protection*, the diffenters were as *truly eftablifhed* as the church of England; and that an eftablifhed church, as diftinguifhed from their places of worfhip was, properly fpeaking, an *endowed church;* a church which the law not only protected, but endowed with temporalities for its peculiar fupport and encouragement. It deferves to be confidered, that the penalties inflicted by the act of toleration on thofe who difturb any diffenting congregation for divine worfhip, or mifufe the preacher, are precifely the fame as on thofe who difturb the congregation, or mifufe the preacher in any cathedral, parifh church, or chapel; and diffenting minifters, as well as the clergy of the church of England, are excufed from all burdenfome offices.

Having ftated the law, as it now exifts with regard to diffenters, we fhall here introduce, for the fatisfaction of our readers, a brief account of their principles and conduct. This feems to be the more neceffary in a work that profeffes to do juftice to perfons of every party and profeffion, both civil and religious, becaufe fome for want of due information (as it is imagined) have conceived them to be a body of perverfe and obftinate people, who feparate from the eftablifhed church without fufficient reafon; and others, for want of adverting to their difcriminating character and general conduct, reprefent them as enemies to the conftitution and government of their country. A juft and candid ftatement of their diftinguifhing tenets is fuch as they have a right to expect: and it will ferve, as the writer of this article apprehends, to conciliate different parties of Chriftian profeffors, to produce mutual forbearance and concord, and thus uniting the feveral members of the community by candour, charity, and good-will, to promote the permanence and profperity of a country, to the honour and welfare of which they are zealoufly attached. The diffenters have complained (how far they have had juft grounds for complaint we leave others to judge) that their principles and character have been mifunderftood and mifreprefented: but at the tribunal of this enlightened age they can have nothing to fear, as their caufe will be liberally tried and determined. Judge Blackftone fpeaks of them as "a fpecies of non-conformifts, who offend through a miftaken or perverfe zeal. Such (he fays) were efteemed by our laws, enacted fince the time of the reformation, to be papifts and proteftant diffenters: both of which were fuppofed to be equally fchifmatics in not communicating with the national church; with this difference, that the papifts divided from it upon material, though erroneous, reafons: but many of the diffenters upon matters of indifference, or, in other words, upon no reafon at all." He allows, however, that our anceftors were miftaken in their plans of compulfion and intolerance; and that all perfecution for diverfity of opinions, however ridiculous or abfurd they may be, is contrary to every principle of found policy and civil freedom. The names and fubordination of the clergy, the pofture of devotion, the materials and colour of the minifter's garment, the joining in a known or unknown form of prayer, and other matters of the fame kind, muft be left to the option of every man's private judgment. Neverthelefs, he reflects on the conduct of thofe puritans, from whom they derive their pedigree, who concurred in the ordinance of 1645, which they alfo condemn (fee Directory); without adverting to the period in which they lived, to the exafperated feelings which they might poffibly have unduly indulged, and without allowing for the imperfect and miftaken fentiments concerning toleration, which then too generally prevailed. He feems alfo to forget, as the diffenters would argue, the fevere fufferings which the puritans experienced both before and after the period to which he refers, and which cannot be parallelled by any event that occurred during the interval of the interregnum. The diffenter would contraft (if recrimination were allowed) againft the unwarrantable conduct of the parliament in 1645, the unrelenting rigours of archbifhops Parker, Bancroft, Whitgift, and Laud. Under the firft of thefe, he would fay, more than 100, and under the fecond, more than 300, pious and learned men, not only members, but minifters of the eftablifhed church, were filenced, fufpended, admonifhed, deprived; many of them loaded with grievous and heavy fines, and fhut up in noifome gaols, where they expired flowly through penury and difeafe: and he would fay, the crimes for which they fuffered thefe fevere punifhments were merely their fcruples about the furplice and the cap, about bowing at the name of Jefus, about Chrift's defcent into hell, and fimilar momentous points. The diffenter would call to mind the hundreds that were fequeftered, driven from their livings, profecuted in the high commiffion court, and forced to leave the kingdom for not punctually conforming to all the ceremonies and rites devifed or enforced by Laud, and for not daring to tell their people, that they might lawfully profane the fabbath-day by gambols and fports. He would, moreover, allege, that many of the canons breathe a perfecuting fpirit, and that the act of uniformity was an unrighteous and perfecuting act; by the operation of which more than 2000 excellent and pious minifters were excluded from the church, and abandoned, with their ftarving families, to great poverty and diftrefs. This diftrefs, it might be urged, was aggravated by another act, which banifhed them five miles from any city, borough, or church in which they had before officiated, and which removed them to a diftance from their acquaintance and friends, who might have miniftered to their relief. The diffenter, in pleading his own caufe, would mention another act, which forbade their meeting to worfhip God any where but in the eftablifhed churches, under the penalties of heavy fines, imprifonment, and banifhment to foreign lands. In confequence of thefe cruel acts, it is faid, that great numbers of pious clergymen, with multitudes of their people, were laid in prifons amongft thieves and common malefactors, where they fuffered the greateft hardfhips, indignities, and oppreffions; their houfes were rudely rifled, their goods made a prey to hungry informers, and their families given up to beggary and want. An eftimate is faid to have been publifhed of near 8000 proteftant diffenters, who had perifhed in prifon in the reign only of Charles II. By fevere penalties inflicted on them for affembling to worfhip God, they fuffered in their trade and eftates, in the compafs of a few years,

years, at leaft two millions; and a lift of 60,000 perfons was taken, who had fuffered on a religious account, betwixt the reftoration and the revolution. (See Neal's Hift. Purit. vol. ii. p. 759.) The diffenters have alfo complained of the difabilities and difgrace entailed upon them by the *Corporation* and *Teft* acts; and alfo of the temporary injury which they fuffered from the *Schifm* and *Occafional Conformity* acts.

Diffenters, in the moft general fenfe of the term, as comprehending thofe who difapproved the doctrines and forms of worfhip fanctioned by the authority of the eftablifhed church, have exifted in this country for many ages. According to this latitude of the appellation, the famous John Wiekliffe, who lived in the 14th century, was a diffenter: for, independently of his objections to feveral doctrines of the church of Rome, then the eftablifhed church of England, he maintained moft of thofe points by which the puritans were afterwards diftinguifhed. But it was not till after the reformation, in the year 1548, and under the reign of king Edward VI., that the controverfy commenced, whieh afterwards occafioned a feparation from the church. This controverfy arofe from bifhop Hooper's refufing to be confecrated in the popifh habits. This circumftanee produced a divifion among the reformers, and gave rife to the two parties of "Conformifts" and "Non-conformifts;" archbifhop Cranmer and Ridley being at the head of the former, and bifhop Hooper, Rogers, and the foreign divines, efpoufing and fupporting the caufe of the latter. Under the reign of queen Mary, when popery was re-eftablifhed, many of the more eminent reformers fled abroad for fecurity; and at Franckfort, where the number of exiles was moft confiderable, that conteft and divifion began, which, in 1556, gave rife to the puritans, and to that feparation from the church of England, which continues to this day. (See PURITANS.) Soon after the acceffion of queen Elizabeth, *viz.* in the year 1559, "An Act for the Uniformity of Common Prayer and Service in the Church, and Adminiftration of the Sacraments" was paffed; and upon this fatal rock of uniformity in things merely indifferent, in the opinion of the impofers, was the peace of the church of England fplit. The court reformers and the puritans were divided in opinion, with regard to a variety of fubjects that engaged their attention. The principal queftion, however, concerning whieh they difagreed, related to the obligation and enforcement of things indifferent in their own nature, which, as the reformers maintained, might be fettled, determined, and made neceffary by the command of the civil magiftrate, and authoritatively enjoined on the obfervance of all fubjects; but, with regard to thefe the puritans infifted, that things which Chrift had left indifferent, ought not to be made neceffary by any human laws; and that fuch rites and ceremonies as had been abufed to idolatry, and manifeftly tended to lead men back to popery and fuperftition, were no longer indifferent, but were to be rejected as unlawful. It is to be regretted, that both parties were too well agreed, in afferting the neceffity of uniformity in public worfhip, and of ufing the fword of the magiftrate for the fupport and defence of their refpective principles; which they mifemployed in their turns, whenever they could grafp the power into their hands. The ftandard of uniformity, according to the bifhops, was "the queen's fupremacy and the laws of the land;" according to the puritans, "the decrees of provincial and national fynods," allowed and enforced by the civil magiftrate; but neither party was for admitting that liberty of confcience, and freedom of profeffion, which is every man's right, as far as is confiftent with the peace of the civil government under which he lives. The terms of minifterial conformity at this time, *viz.* in 1560, were the oath of fupremacy, compliance with the act of uniformity, and a declaration of faith, iffued by order of both archbifhops, metropolitans, and the reft of the bifhops, for the unity of doctrine, &c. Many of the learned exiles, who were now returning home, and others, difapproved of the fecond article, and refufed to accept of livings in the church, according to the act of uniformity, and the queen's injunctions. The queftion about habits was foon after revived; and the difcuffion of it produced confiderable agitation. Thofe who refufed them were punifhed in a variety of ways. At length, *viz.* in 1566, the impofition of the habits, and fome other ceremonies, which the puritans were compelled by law to adopt, produced a feparation. In the following year, they urged a great number of other objections againft the hierarchy, and various ceremonies, for the ufe of whieh there was no foundation in Scripture, or primitive antiquity; and whieh, therefore, as they argued, ought not to have been impofed. In points of doctrine there was no difference between the puritans and eonformifts. The chief leaders of the feparation were beneficed perfons within the dioeefe of London; and thefe had their followers of the laity, who forfook their parifh churches, and affembled with the deprived minifters in woods and private houfes, to worfhip God, without the habits and ceremonies of the church. Many fevere meafures were adopted, in order to compel them to fubmit; but they were ineffectual; nor did any efforts for parliamentary relief, on the part of the puritans, prove of any avail. See PURITANS.

The reftoration of Charles II. in 1660, was accomplifhed at a period when the prefbyterians, one clafs of proteftant diffenters, were in poffeffion of the whole power of England; and they were the principal inftruments of effecting it. They have been juftly blamed, however, for bringing in the king without a previous treaty, and for trufting a fet of men, whom they knew to be their implacable enemies. Many of them lived long enough to fee their error, and heartily to repent of it. The king was ungrateful; foon forgot his promifes of kindnefs; and in the year 1661, the corporation act was paffed. (See CORPORATION.) This was foon followed by the Savoy conference, which terminated without fuccefs, as no alterations were made in the common-prayer book that were favourable to the prefbyterians, for it was refolved to gratify them in nothing. Indeed, the common-prayer book was made more exceptionable, and the terms of conformity much harder than before the civil war. See CONFERENCE.

In the fpring of 1662, "the act of uniformity" was brought into parliament (fee UNIFORMITY); and in confequenee of it the terms of conformity were higher than before the civil wars. The prefbyterian minifters were allowed only three months to confider what to do with themfelves and their families. Befides other objections which occurred, that which the diffenters, of all denominations, refufed, was giving "their affent and confent to all and every thing contained in the book of common prayer." This, they apprehended, to be more than was due to any human compofition. Some of the non-conformifts quitted their ftations in the church before the 24th of Auguft; and when the fatal St. Bartholomew came, about 2000 minifters relinquifhed their preferments in the church, or refufed to aecept of any on the terms of the act of uniformity. Among thefe were many men much valued and diftinguifhed by their abilities and zeal, caft out of their poffeffions in an ignominious manner, deprived of their means of fubfiftence and opportunities of ufefulnefs, and reduced to a neceffity, which both their principles and their circum-

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ftances juftified, of forming feparate congregations. The perfecution they thus fuffered tended to excite compaffion, and to enfure efteem.

Mr. Locke calls them worthy, learned, pious, orthodox divines, who did not throw themfelves out of fervice, but were forciby ejected. So injurious was this event to the church itfelf, that many poor livings in the country had no incumbents for a confiderable time. Many, who complied with the terms of conformity, did it, not becaufe they approved them, but for the fake of their families, or becaufe they were unwilling to be buried in filence. Several young ftudents, who were defigned for the pulpit, applied themfelves to law or phyfic, or diverted their views to fome fecular employment. This act was paffed after the king had engaged his faith and honour in his declaration from Breda, to preferve liberty of confcience inviolable; which promife opened the way for his reftoration; and after the royalifts had given public affurance, that all former animofities fhould be laid afide as rubbifh, under the foundation of univerfal concord.

The name of puritans was now changed into that of proteftant non-conformifts; who were fub-divided into prefbyterians, independents, anabaptifts, and quakers. The king was a concealed Roman catholic; and the court was difpofed to pafs the act of uniformity in the fevereft terms, in order to make the number of diffenters more confiderable; and when this was objected, it was replied, the more diffenters the better, becaufe it will make a toleration more needful, in which the papifts will be included. In December 1662, the king, with the advice of his privy council, publifhed his declaration of indulgence. This was fucceeded, on the pretence of a plot in the north, by an act for fuppreffing feditious conventicles (16 Car. II. c. 4.) (See CONVENTICLE.) In October 1665, the Oxford five-mile act, entitled "An act to reftrain non-conformifts from inhabiting corporations," (17 Car. II. c. 2.) received the royal affent. Some few took the oath required by this act; but the great body of non-conformift minifters refufed it; and preferred going to banifhment. In the year 1668, a comprehenfion (which fee) was projected; but the fcheme was defeated by the court-bifhops and the friends of lord Clarendon; and the perfecution was renewed. And in April 1670, the conventicle act was revived, with fome additional claufes. (Stat. 22 Car. II. c. 1.) On this act great numbers were profecuted, and many induftrious families reduced to poverty. Many minifters were confined in gaols and clofe prifons; and warrants were iffued againft them and their hearers, by which great fums of money were levied. In 1672, a new declaration of indulgence was iffued, which was foon recalled. But this mode of obtaining relief, by the exercife of the difpenfing power, was very far from being fatisfactory to the non-conformifts. (See DISPENSATION *of the king.*) The teft-act was paffed in 1673. (See TEST.) In 1680, although a bill for a comprehenfion, entitled "An act for uniting his Majefty's proteftant fubjects," was committed, it did not pafs the houfe, being changed for another, entitled "An act to exempt his Majefty's proteftant fubjects, diffenting from the church of England, from the penalties impofed upon the papifts by the act of the 35th Eliz." by which act non-conformifts were adjudged to perpetual imprifonment, or obliged to abjure (that is) depart the realm, never to return. This terrible law had lain dormant for almoft 80 years, but was now revived, and threatened to be put in execution by the tories. The repeal paffed the houfe of commons with a high hand, but went heavily through the houfe of lords; but when it fhould have been offered to the king for the royal affent, at the clofe of the feffion, it was miffing, and never heard of more, the clerk of the crown having withdrawn it from the table, by the king's particular order. However, the morning before the houfe was prorogued, (Jan. 10.) two votes were paffed of an extraordinary nature. "1. Refolved, *nemine contradicente*, that it is the opinion of this houfe, that the acts of parliament, made in the reigns of queen Elizabeth and king James, againft popifh recufants, ought not to be extended againft proteftant diffenters. 2. Refolved, that it is the opinion of this houfe, that the profecution of proteftant diffenters upon the penal laws, is, at this time, grievous to the fubject, a weakening the proteftant intereft, an encouragement to popery, and dangerous to the peace of the kingdom." While the parliament was endeavouring to relieve the diffenters, many of the bifhops and clergy of the church of England were pleafed to fee the court inclined to profecute the non conformifts; and in the year 1681, a perfecution of the diffenters was revived by order of the king and court. After the acceffion of James II. they were treated with great feverity, and had few intervals of reft, unlefs by the difpenfing power of the king, which they difapproved, and the benefit of which they knew was intended for the papifts, and not for them. But though the diffenters fuffered much, their number was rather augmented than diminifhed; which fome of their advocates have attributed to their firmnefs and conftancy in a long courfe of trial; to their doctrine and manner of preaching; to the feverity of their morals; to the careful and ftrict education of their children; to a concern for a fucceffion of able and learned minifters, for which purpofe they encouraged private academies in feveral parts of the kingdom; to the perfecuting zeal of the high-church party; and to the fpirit and principles of toryifm, which began to appear ruinous to the nation. At length the act of toleration relieved them from oppreffion. During a courfe of fuffering, as unmerited as it was fevere, they were led to examine the principles of their diffent; and the more they examined them, the more they were led to approve them, and the more firm and zealous they were in maintaining them.

Diffenters may be led, by the brief furvey which we have enabled them to take of the perfecuted and diftreffed condition of their anceftors, to congratulate themfelves on account of the happier circumftances in which their lot is caft; to maintain their fteady attachment to a government that protects them; and to wait with patience for the arrival of that period, in which all remaining difabilities will be removed, and the legiflature fhall render them capable, in confiftency with their avowed principles, of occupying thofe pofts of honourable fervice and emolument, from which they are now excluded. Their advocates allege, that whilft they feparate from the eftablifhed church with fome degree of reluctance, and whilft it muft be their wifh to unite with the enlightened and liberal members of this church in the profeffion of their faith, and the exercife of their worfhip, they are conftrained to diffent, not from capricioufnefs and perverfenefs of temper, but from the conviction of their minds, and from a confcientious regard to what they conceive to be truth and duty. Diffenters are not men of fo peculiar a turn of mind, as to love fuffering and reproach, or to defpife the dignities, preferments, and lucrative pofts, which are fhared among their fellow-fubjects; could they with a good confcience partake of them, as they incline to think they have a natural right to do. It has been faid, indeed, by a learned judge already cited, "that many diffenters divide from the church upon matters of indifference, or, in other words, upon no reafon at all." Allowing them to be perfectly indifferent, it has been faid, that the autho-

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rity by which they are enjoined and made neceffary to the inftitutions of Chrift, and to a participation of Chriftian ordinances, may be reafonably called in queftion. The 20th article of the church of England afferts, indeed, "that the church hath power to decree rites and ceremonies, and hath authority in matters of faith." If the church hath really this authority and power, then all objections urged by diffenters againft particular articles of faith, or modes of profeffion and worfhip, muft be vain and impertinent; becaufe the church, fuppofed to poffefs this authority, ought to be reverently obeyed. But this authority, claimed on behalf of the church, is controverted by the diffenters. They affert, that Jefus Chrift alone hath this authority; that he hath exprefsly commanded that no power of this kind fhall ever be claimed, or ever be yielded, by any of his followers; that no power can make that neceffary which he hath not made neceffary; and that what is indifferent in its own *nature*, ought to be left indifferent in *practice*, and fhould not be bound upon Chrift's fubjects either by civil or ecclefiaftical laws: neither of which can, in this cafe, be of any validity, as being both alike of human origin. That "all things fhould be done decently and in order" (1 Cor. xiv. 20.) they admit; but they think there is a manifeft difference between circumftances of natural decency and order, which are neceffary to be agreed upon and obferved, in order to the performance of any divine worfhip at all: and fuch rites and ceremonies, fuch additions to divine inftitutions, as are not at all neceffary, in the reafon of the thing, or by any law of Chrift; but only enjoined by a human, that is, in this cafe, an incompetent authority. Befides, "a power in the church to decree rites and ceremonies, and authority in matters of faith," is a principle fo indefinite, and fo extenfive in its influence, that under the fhadow of it, have grown up all the enormous innovations and fuperftitions of the church of Rome. But it has been faid, that if the church of England claims and exercifes this power, and obliges all its minifters to fubfcribe to articles of faith, which it hath authoritatively decreed, and to ufe in religious worfhip ceremonies and rites, which it hath authoritatively enjoined; hath not the church of France, the church of Spain, the church of Rome the fame authority and power? This is not an exclufive privilege pertaining to one church. If it be allowed that the church of Rome hath this prerogative, fuch a claim, it has been faid, will overthrow the reformation itfelf, and fubvert the very foundation of the church which we wifh to eftablifh. It may be faid, however, that our church hath exprefsly guarded againft any fuch abufe of the power it claims, by adding in the 20th article: "Yet is it not lawful for the church to ordain any thing that is contrary to God's word written; neither may it fo expound one place of Scripture that it be repugnant to another." But of this repugnance and contrariety, the church, and not every private perfon, is the only proper judge: for if every private perfon hath authority to judge of the church's decifions, and to reject them if they appear to him repugnant to Scripture, then the church's authority, in points of faith, comes to juft nothing at all. It is an authority to decree, where none are bound to fubmit; that is, an authority over nobody, and authority to do nothing. But if this authority be conceded to the church, it will be faid by fome, that it is inconfiftent with the natural right which every man has to judge for himfelf, and make profeffion of that religion which he apprehends to be moft agreeable to truth, and the facred writings, which are the only authoritative rule of his faith or practice, as far as it does not affect the peace and fafety of the government under which he lives; without being determined by the prejudices of education, the laws of the civil magiftrate, or the decrees of councils, churches, or fynods. It will be inquired, however, where does the church pretend to be the only proper judge, or where difallow private Chriftians to judge for themfelves in thefe matters? To which it will be replied, the authority it claims is of this kind; it has exprefsly decreed 39 articles of faith for the purpofe "of taking away difference of opinion, and to eftablifh an agreement in true religion." (See Pref. to 39 articles.) Befides, it is alleged, that in the 34th article private judgment is forbidden to oppofe the common order of the church, and the authority of the magiftrate; and when it prefumes to do fo, it is to be cenfured and punifhed. Moreover, fome have inquired who are the perfons that are invefted with this authority and power? In other words, who are the church? This power to order the manner of God's worfhip, and to fettle articles of faith, it has been faid, is not at all lodged in the bifhops and clergy, who are ufually denominated our fpiritual paftors and guides, but entirely in the king and parliament of thefe realms, under whofe direction and controul the clergy are to act. Accordingly the diffenters allege, that the church of England is a parliamentary church: not properly an ally, but a mere creature of the ftate; depending entirely upon the acts and authority of parliament for its very effence and frame. The qualifications of its minifters, their power to officiate, the manner in which they are to adminifter the facraments, are all limited and prefcribed by authority of parliament, and this authority, which at firft made, can alone alter and new make it; can abolifh, or add to its articles or rites according to its pleafure, even though the whole body of bifhops and clergy ever fo much diflike or proteft earneftly againft it. The diffenters farther inquire, how the civil magiftrate has acquired this authority in the Chriftian church? Who gave him this power to decree rites in Chriftian worfhip, which Chrift never decreed, and to make articles of faith, which Chrift never made? Neither Chrift, nor the apoftles, as they fay, ever gave him this authority; and therefore they wifh to know whence it is derived? The fubjection to higher powers, and obedience to magiftrates, which the Scriptures enjoin on Chriftians, relates, as they conceive, only to civil, not at all to religious matters; becaufe the magiftrate at that time was every where pagan. So far is Chriftianity from enjoining, that it actually forbids obedience to civil governors in things of a religious nature. It commands us to "call no man upon earth father or mafter," (Matt. xxiii. 8, 9.) *i. e.* to acknowledge no authority or jurifdiction of any in matters of religion, but to remember that "one only is our mafter" and lawgiver, even Chrift; and that all Chriftians are brethren, having no dominion over one another. (Matt. xx. 25.) Chrift, the only authorized and fovereign legiflator of the Chriftian church, directs his followers "to render unto Cæfar the things that are Cæfar's, and unto God, the things which are God's."

The apoftles, who certainly, if any perfons, might have pretended to authority in matters of faith, declared, that they "had no dominion over the faith" of Chriftians (2 Cor. i. 4.) They appealed to reafon and confcience, and referred the final decifion to every man's own private judgment; "we fpeak as unto wife men; judge ye what we fay." (3 Cor. x. 15.) The Berœans are commended for "fearching the fcriptures" of the O.T. "daily," to fee, "whether the things" which the apoftles declared to them "were fo" as they reported. And it is the duty of every Chriftian to endeavour, for himfelf, to underftand the facred oracles, as well as he is able, in the ufe of all the means and helps which divine Providence puts into his power; and thus fhould every man "be fully perfuaded in his own mind." We believe many things upon "human authority;" meaning by authority

rity "teftimony;" but there is a manifeft difference between human teftimony as to matters of fact; and human authority, as to matters of opinion, and principles of truth. The former may be, and often is, a rational ground of belief; the latter is believing upon no evidence, and is a renunciation of reafon. The authority or teftimony of the apoftles, and firft teachers of Chriftianity, was accompanied with divine credentials; and this rendered it a fufficient foundation for the belief, both of the facts and doctrines they revealed. And, indeed, human teftimony, under the influence of infpiration, and fupported by miraculous interpofition, is *always* a juft ground of our belief of religious truth, as well as facts; but the authoritative decrees and injunctions of fallible, uninfpired men, *never*. The former claim an abfolute regard, as being a proof and evidence of a divine miffion; the latter are no evidences of religious truth, or ground of belief of it at all, and therefore deferve no regard. Should it be alleged, that other men's underftandings are more penetrating and judicious than ours; or, that great numbers, efpecially of perfons venerable for their age as well as for their piety and learning, are more likely to be in the right than a few individuals; and that, therefore, it will be *fafer* to be guided by their judgments than by our own. To this argument it is replied; that a man's own underftanding, be it more or lefs judicious, is the only faculty which God hath given him to diftinguifh truth from error; and as every man is accountable for the ufe of his own underftanding, not for that of other men's; confequently, his fafety confifts not in giving up his own to the direction and controul of others, but in ufing it himfelf to the beft advantage. And fhould he, in the careful and confcientious ufe of it, err; that error will never be imputed to him as a crime; whereas, if he follow the judgment of other men, though ever fo wife and learned, contrary to his own fenfe of things, he may, perchance, *profefs* what is *right*, but he *does* what is *wrong;* and is highly criminal in the fight of God. For, the profeffion of any doctrine fhould always follow conviction of the truth of it; at leaft, a man muft never profefs what is contrary to his conviction. To embrace or profefs any point which he does not believe to be true, in compliment to human authority, is exalting *human* into the place of *divine* authority; and faying in one word, "that it is better to obey man than God." It has been further obferved, that fubmitting to the decifions of human authority in matters of faith is fometimes prejudicial to, and fubverfive of, true religion, where it does not iffue in downright hypocrify. For as, on the one hand, by the exercife of our rational faculties in fearching after truth, we are not only likely to arrive at it, but to improve in the love of it, in candour, docility, and opennefs to conviction; and are difpofed to fubmit to its influence; fo, on the contrary, in proportion as we refign ourfelves to the conduct of human authority, truth lofes its charms, and its influence over us; and we become blind to its cleareft evidences, and brighteft characters, and are thus prepared to be led into the moft abfurd fuperftitions, and vileft corruptions of religion. (See HERESY.) Should it be faid that no man is at liberty to declare or profefs any fentiments different from thofe by law eftablifhed; this maxim, it may be replied, will vindicate the exercife of human authority in fupport of every eftablifhment that ever was or will be: Mohammedifm at Conftantinople; popery at Rome; epifcopacy in England; prefbyterianifm at Geneva, or in Scotland. The fame principle, purfued to its confequences, would have precluded the reformation from popery, and would even have ftifled in its birth our holy religion itfelf.

By fuch reafoning diffenters have vindicated the right of private judgment in the province of religion, and their deviation, with regard to articles of faith and forms of worfhip, from the national eftablifhment. The church, they fay, is the kingdom of Chrift, "a kingdom not of this world;" and he is the *fole* lawgiver, fovereign, and judge, in all matters of religion; and whilft "they ftand faft in the liberty with which he has made them free," they think themfelves exempt from the charge of *fchifm*, (which fee.) in departing peaceably from the communion of the eftablifhed church. (See CHURCH.) If we inquire, they fay, after the conftitution of the church of Chrift, we muft look for it only in the *Bible;* according to the maxim of the excellent Chillingworth; "the bible only is the religion of proteftants; but the conftitution of the church of England is found in the ftatute-book, in the canons, and common-prayer book, and in the codes of the Englifh law."

Differing from one another, as well as from the articles of the eftablifhed church, in a variety of fpeculative opinions, and alfo from eftablifhed forms and ceremonies, the diffenters allege that thefe were drawn up when the kingdom was juft emerging out of popifh darknefs; and that in drawing them up, efpecial regard was had to the *then* weaknefs of the people, who could not all at once be entirely brought off from the old ceremonies and forms; and that there are feveral parts of our liturgy, and ecclefiaftical conftitution, which many, even of our bifhops and clergy, have wifhed to fee altered; but they chiefly object to the *impofition* of rites and practices that are mutable and indifferent, and of doctrines, concerning which the wifeft and beft men have difagreed, and may continue to difagree without injury or danger, as long as they preferve the unity of the faith in the bond of peace and mutual forbearance. They object to *fponfors* in baptifm, *confirmation*, the *abfolution* of the fick and dying, kneeling at the *facrament* and the adminiftration of it as a teft, the prefcribed and indifpenfable ufe of certain *habits*, the office for burial of the dead, bowing at the name of Jefus, fubfcription to articles of faith, compofed by fallible men, the damnatory claufes of the Athanafian creed, the nature and mode of epifcopal ordination, the withholding from Chriftian laity the right of chufing their own minifters, the various ranks and powers fubfifting among the clergy, &c. &c. &c. Diffenters object, and more particularly, to the impofition of articles of faith, and ceremonies of worfhip, which they conceive to be unauthorifed by the fcripture, and inconfiftent with their notion of its fufficiency, and with the right of private judgment.

As to the political principles and conduct of the diffenters, it will be fufficient, as they apprehend, to refer to the truth of hiftory, impartially and candidly contemplated, and to the unequivocal teftimony of their advocates and even of many of their adverfaries, ancient and modern. It has been faid, indeed, that the diffenters hold principles unfriendly to fociety, and to civil government; principles, which, in the extreme, have produced the moft fatal effects, both at home and abroad; but this has been chiefly faid by perfons who have confounded their principles, in their nature and tendency, with thofe, which, being carried to an extreme by the anabaptifts in Germany, and the high-monarchy men in England, in the 17th century, produced very extravagant confequences. Whilft, in the opinion of proteftant diffenters, the magiftrate fhould not expect, much lefs exact, obedience or fubmiffion in matters purely religious, and that in things pertaining to confcience, it is the duty of the fubject to act upon the principle of the apoftles and primitive Chriftians; that is, to "obey God rather than man:" they are fo far from fetting up the fuppofed interefts of religion againft lawful magiftracy, or the peace and good order

order of ſociety, that they allow of the exemption of none from the authority of the civil magiſtrate; holding all to be equally under his juriſdiction; and that no plea of ſacred character, or of religion and conſcience, is to be admitted in bar to his procedure, in matters of a criminal, or merely civil nature. And as, in their opinion, it is his duty to *protect* all *good ſubjects* in the profeſſion of their religious principles; ſo, without any regard to their religious principles or profeſſions, he is to *puniſh* all *offenders* againſt the *peace* of ſociety. No diſſenter on earth is now ſo abſurd as to hold, that "dominion is founded in grace," and that "the ſaints muſt rule the world;" or any principles which have the leaſt tendency and aſpect towards ſuch a concluſion. On the contrary, they all aſſert, that religion is ſo far from veſting in its profeſſors a title to *dominion*, that it is no exemption from *civil ſubjection*. It is in matters of conſcience only, they apprehend, they are alone accountable to God: and that not ſo as to excuſe thereby any criminal overt acts, inconſiſtent with the peace of ſociety: *theſe* the magiſtrate muſt puniſh, from whatever principle they proceed, from any or none, and whatever plea of that ſort is offered in their favour. The diſſenters zealouſly maintain, in conformity with reaſon and ſcripture, that "Chriſt's kingdom is not of this world," and doth not at all interfere with the office of the magiſtrate; who, in their opinion, is ſupreme over all perſons within his dominions, of whatever religion, of any or none. In a word, their principles, with reſpect both to church-authority and to civil government, are preciſely the ſame which biſhop Hoadly advanced, and ſupported by ſound argument; doing thereby ſuch ſervice to the cauſe of true proteſtantiſm, and of the royal ſucceſſion in the houſe of Hanover, as will always be remembered with gratitude by the true friends of that auguſt family and of the liberties of their country. It has been affirmed by thoſe who beſt knew their principles, that there are no better ſubjects, and no better friends to the conſtitution of their country as a limited monarchy, defined and improved by the glorious revolution, than the proteſtant diſſenters; they pray for the continuance of the proteſtant ſucceſſion in the preſent illuſtrious family, and for the *ſalus regis et populi*, in the words, and with the fervour, with which father Paul prayed for the republic of Venice in his dying moments; "ESTO PERPETUA!" How their anceſtors acted in the period preceding the revolution, appears in the abſtract of their hiſtory which we have already given. Of their firm and zealous attachment to the family on the throne, they have given unequivocal proofs. When the kingdom, about the middle of the laſt century, was aſſailed by the adherents of another claimant to the crown; when the loyalty of many of thoſe who were near the perſon of the king was ſuſpected, and when terror had palſied even more than corruption had ſeduced; there was not *one* man, not a *ſingle individual* of their ſociety, who joined the enemies of his majeſty's houſe: at that time, the diſſenters, regardleſs of the dreadful penalties of the law, and anxious for their country alone, eagerly took arms; and as ſoon as the danger was paſſed by, they were compelled to ſolicit the protection of that general *mercy* which was extended to the very rebels againſt whom they fought, and to ſhelter themſelves under that *act of grace*, which was granted to the very *traitors* from whoſe arms they had defended the crown and life of their ſovereign. Amongſt thoſe who have borne honourable teſtimony to the principles and character of the diſſenters as members of the civil community, we may mention Dr. Secker, archbiſhop of Canterbury, who, in his "Letter to Mr. Walpole concerning biſhops in America," ſays, "the diſſenters are ſincere well wiſhers to the civil part of our preſent happy eſtabliſhment; and they are to be eſteemed and loved for it." The teſtimony of this prelate is the more important, as he was not only born of diſſenting parents, but received his education, together with the late excellent biſhop Butler, in one of their academies, under a tutor, whoſe great learning and abilities would have been no little honour to either of our univerſities. Lord North, in the courſe of the debate on a motion for the repeal of the teſt laws, whilſt he was pronouncing a panegyric on the conſtitution of the church, liberally declared, that when he profeſſed an attachment to the principles on which thoſe laws reſted, he did not mean to throw any reflection on the opinions of thoſe who conſcientiouſly differed from his ſentiments. He deprecated the idea, that he ſhould be thought to treat the diſſenters as men, who deſerved diſlike or puniſhment. He knew their virtue, their morality, their learning. The right honourable Mr. Charles Fox, referring in the ſame debate to the teſtimony borne in favour of the diſſenters by lord North, ſaid, he had ſpoken liberally and handſomely of the diſſenters. Why? becauſe he felt the propriety and the juſtice of ſuch a teſtimony. He knew that they had been ſteady in their attachment to government; that their religious opinions were favourable to civil liberty; and that the true principles of the conſtitution had been remembered, and aſſerted by them, at times, when they were forgotten, perhaps betrayed, by the church. Such had been the character of the diſſenters; and he farther maintained, that their political opinions were not now different from what they had been formerly. Pierce's Vindiciæ, &c. Neal's Hiſt. Puritans. Furneaux's Letters to Blackſtone. Towgood's Letters. See CHURCH, NON-CONFORMISTS, PURITANS, TEST, and TOLERATION.

DISSENTIS. See DISENTIS.

DISSEPIMENTUM, a partition, in *Botany*, ſerves to divide the internal part of a fruit into two or more cells. The partitions of a capſule ſometimes originate from the centre of its valves, as in Juſſieu's natural order of *Ericæ*, or from the inflexed margins of thoſe valves as in his *Rhododendra*. Hence he has lately ſeparated from the former order the *Erica Dabeoci* Sm. Fl. Brit. 420. Engl. Bot. t. 35, and referred it to *Menzieſia* a genus founded by Dr. Smith upon that very circumſtance. It appears however that ſome ſuppoſed *Ericæ* have the ſame ſtructure, though none of the *Rhododendra* have a partition from the centre of their valves. Some plants have partitions ſpringing from the central pillar or *columella*. Pods, *Siliquæ*, have moſtly a longitudinal membranous partition, dividing them into two cells, with a thick edge to which the valves are originally attached, as in the Sattin-flower, *Lunaria*, the various kinds of Stock, *Cheiranthus*, &c.

DISSIDENTS, in a general ſenſe, denote thoſe who differ from the eſtabliſhed religion of the country in which they live: but, in its more appropriate meaning, the denomination is applied in Poland to thoſe of the Lutheran, Calviniſtic, and Greek profeſſion. The hiſtory of this party, as it is ſketched by the Poliſh hiſtorians, is detailed by Mr. Coxe in his hiſtory of Poland. (Travels, vol. i.) The reformation was introduced in the reign of Sigiſmond I. who aſcended the throne in the year 1506, and who perſecuted its followers: but their number, however, increaſing, his ſon Sigiſmond Auguſtus, who ſucceeded his father in 1548, not only indulged them in the liberal exerciſe of their worſhip, but admitted them, together with the Greeks, and all other ſects then ſubſiſting in Poland, to a ſeat in the diet, and to all the honours and privileges hitherto confided to the catholics. Theſe maxims of unlimited toleration were generally adopted by the nation, and the members of the diet, which aſſembled upon the deceaſe of Sigiſmond Auguſtus, being of different perſuaſions,

persuasions, determined on a reciprocal indulgence of their respective tenets. To avoid invidious distinctions, they called themselves indiscriminately "dissidents in religion," a phrase intimating, not, according to our notions, separatists from an established church, but persons holding different opinions in religious matters. It was at the same time enacted, that this difference of religious sentiments should create no difference in civil rights; and accordingly in the *Pacta conventa* formed by the diet, a clause was inserted as part of the coronation oath: "I will keep peace among the dissidents." Henry, who objected to this universal toleration, withheld his consent, till one of the Polish envoys exclaimed, "Unless you confirm this article, you cannot be king of Poland:" he accordingly took an oath to observe this clause, before he was permitted to ascend the throne. In process of time, the Roman Catholics, having acquired a considerable ascendency, ventured to apply the appellation of dissidents to all those who dissented from the catholic religion. This restriction was at first attended with no encroachments on the privileges of the other sects; and the term dissidents was not regarded in an obnoxious light. The dissidents indeed still continued in such unquestioned possession of all rights, civil and religious, that, when it was agreed by both catholics and protestants to persecute the Arians, it was thought previously necessary to expel them from the body of dissidents. In consequence of this exclusion, the Arians, in the reign of John Casimir, were first rendered incapable of being elected nuntios, afterwards deprived of their places of worship, and finally banished. This persecution, inadvertently assented to by the Protestants and Greeks, was a prelude to their sufferings: for, as the Catholic party predominated, the term dissidents, at first confined to persons professing the Protestant religion, *viz.* the Lutherans and Calvinists (other Protestant sects, such as the Mennonites, Anabaptists, Quakers, and Arians, not being included among the dissidents,) and that of the Greek church, became of a less inoffensive import, and conveyed an idea of non-conformity. The sectaries, accordingly, who were still distinguished by the appellation of dissidents, perceiving the intention of the Catholics to undermine their privileges, obtained a declaration, that they should not be blended with, and be obnoxious to the penal laws enacted against the Arians. But these promises were insensibly eluded; their privileges were gradually diminished, in the course of a few years they were subjected to a variety of disqualifications, and, at length, in 1733, formally incapacitated from sitting in the diet. A law of Ladislaus II. against heretics, as well as the penalties against the Arians, were revived, and occasionally extended to the dissidents. These continual persecutions greatly diminished their number, and rendered their remonstrances ineffectual: the catholics, who took the lead in the diet, even declared it high treason to seek the restoration of their immunities by the intercession of foreign powers, in direct contradiction to the treaty of Oliva, in which it was stipulated, that the rights of the dissidents should be maintained in their full latitude.

Such was the situation of the dissidents at the accession of Stanislaus Augustus, who, though strongly inclined to toleration, was obliged to concur with the general sense of the diet, and confirm the laws which had been promulgated against them. The dissidents applied to the courts of London, Petersburg, Berlin, and Copenhagen, as the mediating powers in the treaty of Oliva, who warmly supported their cause, and presented memorials to the diet, demanding a restoration of their religious establishments, and of all the privileges secured to them by that treaty. The diet of 1766, however, was not of a temper to accede to these proposals. The enemies of toleration contended that the privileges were obsolete, having been repeatedly abolished in various diets, and that the dissidents had no well-founded claim either to the restitution of their civil immunities, or to the toleration of their worship: the bishop of Cracow, the most bigotted of the catholics, even proposed a law against their catholic abettors. Violent altercations arose in the assembly; and the members separated in great disorder. On a subsequent day, the violence of party was renewed, and the acts against the dissidents confirmed. But to conciliate the mediating powers, the bench of bishops, by command of the diet, drew up nine articles in favour of the dissidents, relative to the free exercise of their worship. These accessions not being deemed sufficiently favourable, while the exceptionable laws were unrepealed, the empress of Russia remonstrated against the proceedings of the diet, and the dissidents began to form confederacies in different parts of the kingdom. They were joined by many discontented catholics, and assisted by a large body of Russian troops, who entered Thorn, where the first and principal confederacy took its rise. All the mediating powers, Great Britain, Denmark, Prussia, and Sweden, testified their approbation of these confederacies, which gradually comprehended political grievances, and which were strengthened by other confederacies among the catholic nobles, who affected to be advocates for toleration, and declared their intentions of supporting the cause of the dissidents. The coalition of this catholic confederacy with that of the dissidents, soon afterwards took place in the palace of prince Radzivil at Warsaw. The king convoked a diet for the purpose of reconciling the opposite parties, but it failed in producing the intended effect. This diet, in a very intimidated and tumultuous state, appointed a grand committee, to adjust, in conjunction with the mediating powers, the affairs of the dissidents, and then broke up. This committee proposed to repeal all the laws enacted against the dissidents, and to restore their ancient privileges; and their pacific resolutions were ratified at an extraordinary diet, convened in the beginning of the year 1768. In consequence of these measures, Poland enjoyed for a moment an universal tranquillity; but it was that sullen calm, which precedes a tempest, and announces the approach of violent commotions. The diet had not been long dissolved, before the indulgences granted to the dissidents excited general dissatisfaction among the Roman catholics, who formed several confederacies in defence of the sacred catholic faith. From this time, Poland became a scene of bloodshed and devastation; and hostilities were protracted from the dissolution of the diet in 1768 to the division of Poland in 1772. At the last meeting of the delegates, who were appointed to adjust the terms of the dismemberment in 1773, the pretensions of the dissidents were finally settled between the republic and the mediating powers. The catholic party violently opposing the restoration of their ancient privileges, by the consent of the foreign courts, they continued excluded from the diet, the senate, and the permanent council. In return, the dissidents enjoyed the free exercise of their religion, were permitted to have churches without bells, schools, and seminaries, were capable of sitting in the inferior courts of justice, and in the tribunal appointed to try appeals in matters of religion, three of their communion were admitted as assessors. In consequence of this toleration, the dissidents constructed churches in different parts of the kingdom; and one built upon this occasion by the Lutherans at Warsaw, has the following inscription:

"Has ædes Deo J. O. facras
Cœtus Varfovienfis in Auguft. Confefs. ex
Confenfu Staniflai Augufti Regis et Reipublicæ
Struere Cœpit, Aprilis 24, 1777."

See POLAND.

DISSIMILAR, in *Anatomy*. Authors divide the parts of the body into fimilar, and diffimilar.

Diffimilar parts, by fome called alfo compound, and organical parts, are fuch as may be divided into various parts, of different ftructure, &c. Thus the hand is divifible into veins, mufcles, bones, &c. whofe fubdivifions are neither of the fame nature nor denomination.

DISSIMILAR *Leaves*, denote the two firft leaves of any plant at its firft fhooting out of the ground.

They are thus called, becaufe they ufually are of a different form from the common leaves of a grown plant.

Thefe Dr. Grew obferves to be nothing but the very lobes of the feed thus expanded, and thus advanced.

Their ufe is for the protection of the plume; which being young and tender, is thus guarded on each fide, and has alfo fome rain and dew gradually conveyed down to it by this means. See PLUME.

DISSIMILITUDE, in *Geometry*, &c. See SIMILITUDE.

DISSIMILITUDE, or *Diffimili*, in *Rhetoric*, &c. is a difagreement of things in quality, and furnifhes an argument, wherein, from diffimilar, or unlike things, other diffimilars are deduced.

Thus Cicero, "Si barbarorum eft in diem vivere; noftra confilia fempiternum tempus fpectare debent." Thus alfo Cicero (in Pifon. c. 14, &c.) fhews the preference of his own exile to Pifo's government of Macedonia, by the difference between their conduct, and the people's efteem of them. Catullus furnifhes a very beautiful argument from diffimilitude.

"Soles occidere & redire poffunt,
Nobis cum femel occidit brevis lux,
Nox eft perpetua una dormienda."

END OF VOL. XI.

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